

ŠKODA

Workshop Manual

Octavia II 2004 ➤

Octavia II 2010 ➤

1.6/72; 75 kW MPI engine

Engine ID	BGU	BSE	BSF	CCS A	CHG A	CMX A			
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Edition 05.2016

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Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

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00 – Technical data

1 Identification

(SRL000955; Edition 05.2016)

⇒ [“1.1 Engine number”, page 1](#)

⇒ [“1.2 Engine characteristics”, page 1](#)

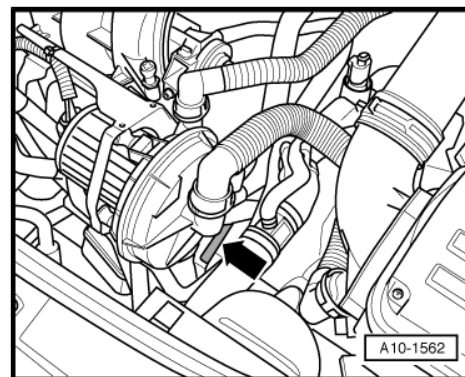
1.1 Engine number

The engine number (“engine identification characters” and “serial number”) is located at the joint separating the engine and the gearbox.

In addition, a sticker with the “engine identification characters” and “serial number” is affixed to the timing belt guard.

The engine identification characters are also indicated on the vehicle data sticker.

- ◆ Starting with the letter “C”, new four digit engine codes have been introduced.
- ◆ The first 3 digits of the engine identification characters refer to the displacement and the mechanical construction of the engine. They are type-punched on the cylinder block including the serial number.
- ◆ The 4th digit refers to the output and torque of the engine and depends upon the engine control unit.



1.2 Engine characteristics

Engine identification characters	BGU	BSE	BSF	CCSA	CHGA	CMXA
Manufactured	02.2004 ➤ 05.2005	06.2005 ➤ 04.2013	06.2005 ➤ 04.2013	11.2007 ➤ 05.2010	06.2009 ➤ 11.2012	05.2010 ➤ 11.2012
Exhaust limit values conforming to	EU-4, EU-2 DDK	EU-4	EU-2	EU-4	EU-4 ➤ 12.2010 01.2011 ➤ EU-5	EU-5
Displacement l	1,595	1,595	1,595	1,595	1,595	1,595
Power output kW at rpm	75/5600	75/5600	75/5600	75/5600	72/5600 (LPG) or 75/5600 (petrol)	75/5600
Torque Nm at rpm	148/3800	148/3800	148/3800	148/3800	144/3800 (LPG) or 148/3800 (petrol)	148/3800
Bore Ø mm	81,0	81,0	81,0	81,0	81,0	81,0
Stroke mm	77,4	77,4	77,4	77,4	77,4	77,4
Compression ratio	10:5	10:5	10:5	10:5	10:3	10:3
Cylinder / valves per cylinder	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2
Fuel - RON	95 unleaded petrol ¹⁾	95 unleaded petrol ¹⁾	95 unleaded petrol ¹⁾	95 unleaded petrol ¹⁾ or biofuel E85 ²⁾	95 unleaded petrol ¹⁾ or LPG ³⁾	95 unleaded petrol ¹⁾ or biofuel E85 ²⁾



Engine identification characters	BGU	BSE	BSF	CCSA	CHGA	CMXA
Ignition system/fuel injection	Simos 7.1	Simos 7.1	Simos 7.1	Simos 7.1	Simos 7.1	Simos 7.1
Knock control	yes	yes	yes	yes	yes	yes
Self-diagnosis	yes	yes	yes	yes	yes	yes
Lambda control	2 Lambda probes	2 Lambda probes	2 Lambda probes	2 Lambda probes	2 Lambda probes	2 Lambda probes
Catalytic converter	yes	yes	yes	yes	yes	yes
Turbocharging	no	no	no	no	no	no
Exhaust gas recirculation system	yes	no	no	no	no	no
Intake manifold change-over	yes	yes	yes	yes	yes	yes
Camshaft adjustment	no	no	no	no	no	no
Secondary air system	yes	yes	no	yes	yes	yes

1) Unleaded petrol RON 91 is also permitted, although engine output is reduced.

2) Biofuel which conforms to the standard E85 contains 85 % bioethanol and 15 % unleaded petrol according to standard ČSN (DIN) EN 228.

3) LPG - liquefied casing-head gas for drive of vehicles.

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2 Safety instructions

⇒ "2.1 Connecting the diagnostic unit, querying and erasing the event memory of the liquefied petroleum gas system (LPG)", page 3

⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8

⇒ "2.3 Safety precautions and rules for cleanliness when working on petrol fuel supply system", page 10

⇒ "2.4 Safety measures to apply when working on the fuel injection and ignition system", page 11

⇒ "2.5 General notes on the injection system", page 12

⇒ "2.6 General notes on the ignition system", page 12

⇒ "2.7 Additional instructions when undertaking assembly work on the air-conditioning system", page 13

2.1 Connecting the diagnostic unit, querying and erasing the event memory of the liquefied petroleum gas system (LPG)

⇒ "2.1.1 Querying and erasing event memory of the LPG control unit", page 3

⇒ "2.1.2 Erasing the fault memory of the liquefied petroleum gas control unit (LPG)", page 6



Note

- ◆ For vehicles manufactured as of 01.2011 (EU5 emission standard), the event memory of the liquefied petroleum gas system (LPG) is queried and erased on the engine control unit using the ⇒ Vehicle diagnostic tester.
- ◆ For vehicles manufactured as of 01.2011 (exhaust emission standard EU-5), the liquefied petroleum gas control unit (LPG) is not self-diagnostic. The petrol engine control unit -J361- controls and manages all the functions of the LPG system (including the event memory). The liquefied petroleum gas control unit (LPG) must only be activated in the "Gateway" for the data update, afterwards the control unit must be deactivated again.

2.1.1 Querying and erasing event memory of the LPG control unit

For vehicles manufactured up to 12.2010 (exhaust emission standard EU-4)

Special tools and workshop equipment required

- ◆ Diagnostic software on CD - Bi-fuel - JNV 910 787-
- ◆ Diagnostic cable for liquefied petroleum gas control unit LPG - JNV 971 603 -
- ◆ Vehicle diagnosis, measurement and information system - VAS 505X- or a notebook



Caution

The liquefied petroleum gas control unit LPG can be damaged when improperly using different functions of the diagnostic program as described below.



Note

- ◆ The diagnostic software on CD - JNV 910 787- must subsequently be installed in ⇒ Vehicle diagnostic tester, where necessary, in a commercially available notebook.
- ◆ The diagnostic connector for the liquefied petroleum gas control unit is located in the engine compartment, namely in the area of the battery, behind which the liquefied petroleum gas control unit (LPG) can also be found.
- ◆ In order to reach the diagnostic connector and the liquefied petroleum gas control unit (LPG), the battery cover must be removed. After the diagnosis is performed, place the connector again in the area of the battery.
- ◆ The event memory of the liquefied petroleum gas control unit (LPG) can only be interrogated while the engine is running. When the ignition is switched on (engine stoppage), a connection with the liquefied petroleum gas control unit (LPG) cannot be established.

Condition

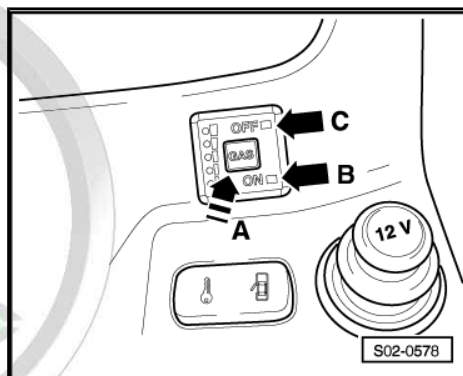
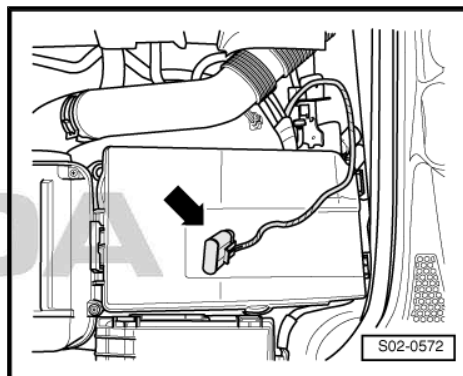
- running engine
- Connect the diagnostic cable for liquefied petroleum gas control unit LPG - JNV 971 603 - to the diagnostic connector -arrow- for the liquefied petroleum gas control unit and to the diagnostic unit -VAS 505X- or to a notebook. First of all, the connector cover must be removed.



Note

A switch-over into the gas mode can take place after the engine temperature has risen above 30 °C and the engine speed has exceeded 1200 rpm.

- Start engine and switch fuel selector switch -E395- to gas mode -A-. When in gas mode, the warning light "ON" arrow -B- lights up on the fuel selector switch -E395- .
- Start the diagnostic program "Bi-fuel".



- Select the relevant status number when starting the diagnostic program “Bi-fuel”:

I: Program status number VW202041G24

or

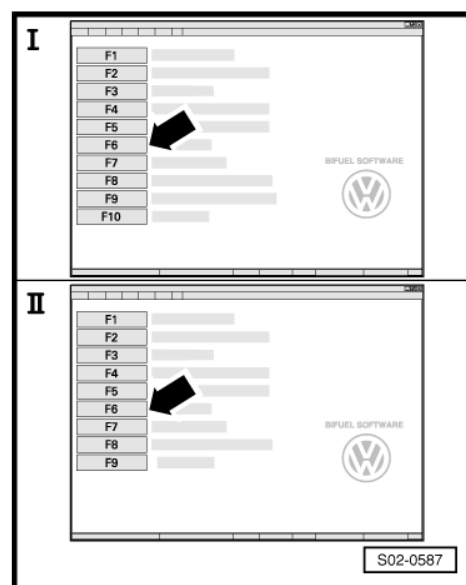
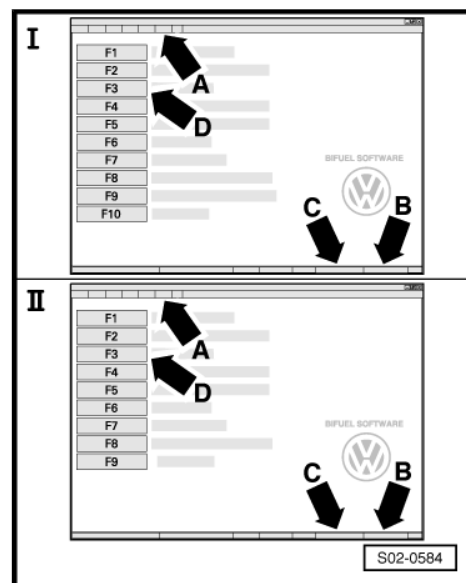
II: Program status number VW202043G34

The status number of the diagnostic program is indicated in the field -arrow C- after the start.

- Select the corresponding language version to use the program -arrow A-.
- Press **[F3]** -arrow D- to establish a connection with the liquefied petroleum gas control unit (LPG).

The field -arrow B- indicates that the connection has been established.

- Press **[F6]**.



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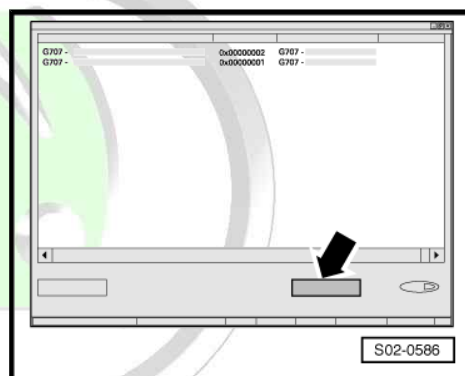
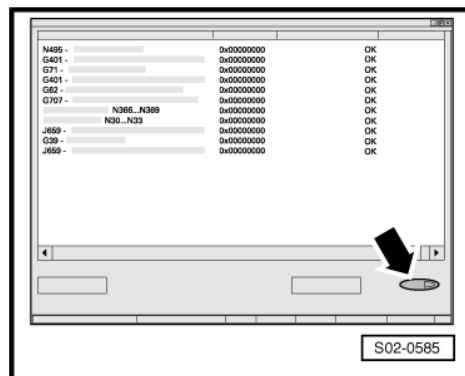
- The program field indicates the list of the system components which are subject to the diagnosis:

- ◆ Valve for gas tank - N495-
- ◆ Gas distribution line sensor (pressure) - G401-
- ◆ Intake manifold pressure sender - G71-
- ◆ Gas distribution line sensor (temperature) - G401-
- ◆ Coolant temperature sender - G62-
- ◆ Sender for gas level indicator - G707-
- ◆ Gas inlet valve - N366...N369 -
- ◆ Injector - N30...N33 -
- ◆ Control unit for gas mode - J659-
- ◆ Lambda probe - G39-
- ◆ Control unit for gas mode (injector) - J659-

- Quit diagnostic programme by pressing the **F10** button (I: Program status number VW202041G24) or **F9** (II: program status number VW202043G34).

If there is a fault, proceed as follows:

- Start the fault list via the button -arrow-.
- Inspect wiring and plug connections according to the current flow diagram, if necessary repair or replace the defective component, while doing so observe safety measures and other rules
⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8 .
- Erase the event memory after repair
⇒ "2.1.2 Erasing the fault memory of the liquefied petroleum gas control unit (LPG)", page 6 .



2.1.2 Erasing the fault memory of the liquefied petroleum gas control unit (LPG)

For vehicles manufactured up to 12.2010 (exhaust emission standard EU-4)

Special tools and workshop equipment required

- ◆ Diagnostic software on CD: Biofuel - JNV 910 787-
- ◆ Diagnostic cable for liquefied petroleum gas control unit LPG - JNV 971 603 -



Caution

The liquefied petroleum gas control unit LPG can be damaged when improperly using different functions of the diagnostic program as described below.



Note

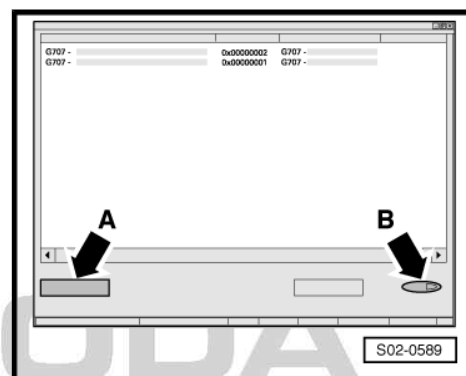
- ◆ *The diagnostic software on the CD - JNV 910 787- must be installed ⇒ Vehicle diagnostic tester afterwards.*
- ◆ *The diagnostic connector for the liquefied petroleum gas control unit is located in the engine compartment in the area of the battery, behind which the liquefied petroleum gas control unit (LPG) can also be found.*
- ◆ *In order to reach the diagnostic connector and the liquefied petroleum gas control unit (LPG), the battery cover must be removed. After the diagnosis is performed, place the connector again in the area of the battery.*
- ◆ *The event memory of the liquefied petroleum gas control unit (LPG) can only be interrogated while the engine is running. When the ignition is switched on (engine stoppage), a connection with the liquefied petroleum gas control unit (LPG) cannot be established.*

Condition

- running engine
- Press button arrow -A- to erase a fault.
- Press button -arrow B- to interrogate the event memory again.

If there is no fault, close the diagnostic window with .

- Quit diagnostic programme by pressing the button (I: Program status number VW202041G24) or (II: program status number VW202043G34).
- Disconnect the diagnostic cable from the diagnostic connector for the liquefied petroleum gas control unit and clip on the cap again, then place the connector once more in the area of the battery.



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2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

Safety measures



DANGER!

- *Service, installation and repair work on the liquefied petroleum gas system as well as their inspections must only be carried out by properly qualified personnel according to the relevant national legislation and standards!*
- *Service, installation and repair work on the liquefied petroleum gas system as well as their inspections must only be carried out by specialist garages with suitable safety elements according to the relevant national legislation and standards!*
- *Service facilities for repairs to the gas system must always be aboveground and never underground. A workshop pit should not be located in these premises.*
- *At least one source of natural ventilation must be assured at all times (also during the cold season).*

When undertaking all work on the liquefied petroleum gas system, use the gas leakage detector for natural gas vehicles - VAS 6227- , which must be switched on constantly during this inspection, in order to continuously check for a possible LPG leakage. Position the gas leakage detector for natural gas vehicles - VAS 6227- as close as possible to the gas system, preferably under the vehicle!!!

- *In auto repair shops, which do not have the suitable safety elements, vehicles with liquefied petroleum gas system (if this is not in contradiction with the legislation and standards of the relevant country) must only be driven in petrol mode and when the valve of the LPG reservoir is shut off ⇒ **"2.4 Closing the liquefied petroleum gas reservoir", page 149** .*
- *At least one source of natural ventilation must be assured at all times (also during the cold season).*
- *Liquefied petroleum gas is highly flammable and forms ignitable mixtures with air.*
- *Because liquefied petroleum gas is heavier than air, it will always settle to the bottom.*
- *No sources of ignition must be located close to the natural gas system (as well as other spark- or flame-producing systems).*
- *The inhalation of natural gas can cause drowsiness and lung damage. In high concentrations, it results in a risk of asphyxia due to lack of oxygen.*
- *Liquefied petroleum gas is not "odourless" because odour intensive substances are mixed with the liquefied petroleum gas.*

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WARNING

- *When working on the liquefied petroleum gas system, the battery earth strap must be disconnected.*
- *After the service, installation and repair work on the compressed natural gas system (CNG), a gas system inspection must always be carried out ⇒ Maintenance ; Booklet Octavia II .*
- *Only system components of the same type and with the same design approval for the manufacture can be replaced.*
- *The components of the liquefied petroleum gas system, on which installation work should be carried out, must first of all be emptied
⇒ "2.3 Emptying and filling up gas line", page 144 , or the gas must be carefully drained (outdoors, never close to buildings, reservoirs or a drainage system).*

Ice accretion occurs when draining gas - do not touch - risk of accident.

- *When undertaking all installation work, particularly in the engine compartment due to its cramped construction, please observe the following:*
- *Install the components of the liquefied petroleum gas system in such a way that the original cable guide of the liquefied petroleum gas system is re-established.*
- *Ensure that there is adequate free access to all moving or hot components, in order to avoid damage to the cables of the liquefied petroleum gas system.*
- *The cables on the liquefied petroleum gas system must not be bent.*

Rules of cleanliness

For all tasks on the liquefied petroleum gas system, carefully pay attention to the following "rules of cleanliness":

- ◆ Thoroughly clean the connection points and their surroundings before releasing.
- ◆ Place removed parts on a clean surface and cover.
- ◆ Do not use fuzzy cloths!
- ◆ Carefully cover or close opened components if the repair is not completed immediately.
- ◆ Only install clean components: Only unpack replacement parts immediately prior to fitting. Do not use any parts which have been stored unwrapped (e.g. in tool boxes etc.).
- ◆ When the system is open: Avoid using compressed air whenever possible. Avoid moving the vehicle.



Safety measures



Caution

There is the risk of gas escaping!

System is under pressure:

- ◆ *High pressure part up to approx. 20 bar (between filler neck, LPG reservoir and evaporator)*
- ◆ *Low pressure part at approx. 2 bar (between evaporator and gas inlet valves/gas distribution line (rail)).*
- ◆ *The gravity valve of the multi-function valve for the LPG reservoir is set to approx. 28 bar. After this pressure has been reached, excess gas is drained from underneath the vehicle.*

Before opening the system lay cleaning cloths around the connection point. Reduce pressure by carefully releasing the connection point.

Wear protective spectacles and protective gloves.

2.3 Safety precautions and rules for cleanliness when working on petrol fuel supply system

Safety precautions when working on the fuel supply system



WARNING

When undertaking all installation work, particularly in the engine compartment because of its cramped construction, please observe the following:

- ◆ *Lay lines of all kinds (for example, for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- ◆ *Ensure that there is adequate free access to all moving or hot components.*

Fuel pump is activated by switching on ignition and via driver door contact switch. Before opening the fuel system and for reasons of safety, if the battery is not disconnected, the connector -arrow- must be disconnected from the fuel delivery unit.

When removing and installing the fuel gauge sender or the fuel delivery unit from a full or partly filled fuel tank, pay attention to the following points:



WARNING

The fuel system is under pressure! Place a clean cleaning cloth around the connection point before detaching hose connections. Reduce pressure by carefully removing the hose.



- ◆ The extraction hose of an exhaust extraction system which is switched on, must be positioned close to the assembly opening of the fuel tank in order to extract the released fuel vapours, even before the work is commenced. If no exhaust extraction system is available, a radial fan (motor not in air flow of fan) with a delivery volume of more than 15 m³/h must be used.
- ◆ Avoid skin contact with fuel! Wear fuel-resistant gloves!

Rules of cleanliness to observe when working on the fuel supply system

Pay careful attention to the following rules of cleanliness when working on the fuel supply or fuel injection systems:

- ◆ Thoroughly clean the connection points and their surroundings before releasing.
- ◆ Place removed parts on a clean surface and cover. Use lint-free cloths!
- ◆ Carefully cover or seal opened or removed components if the repair is not carried out immediately.
- ◆ Only install clean components: Remove spare parts from their wrapping immediately before fitting. Do not use any parts which have been stored unwrapped (e.g. in tool boxes etc.).
- ◆ When the system is open: Avoid using compressed air whenever possible. Avoid moving the vehicle.

2.4 Safety measures to apply when working on the fuel injection and ignition system



WARNING

The fuel system is under pressure! Before opening the system lay cleaning cloths around the connection point. Reduce pressure by carefully releasing the connection point.

Observe the following points to prevent injury to persons and/or damage to the injection and ignition system:

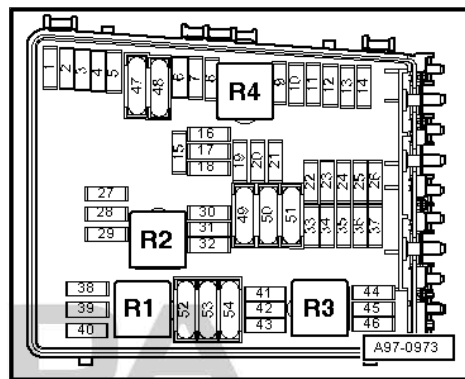
- ◆ Do not touch or remove ignition leads with the engine running or at start speed.
- ◆ Ignition must be switched off before disconnecting and re-connecting the cables of the fuel injection and the ignition system as well as of the test equipment.



- ◆ If the engine must be operated at start speed without it starting, as for example, when checking the compression pressure, open lid of fuse carrier in the engine compartment and unplug fuses F6 and F32 for ignition transformer and for injection valves.

If test and measuring devices are required during test drives observe the following:

- ◆ Always secure the test and measuring devices on the rear seat and have a second person operate them there.
- ◆ If the test and measuring devices are operated from the front passenger seat, the passenger could be injured by the release of the front passenger airbag in the event of an accident.



2.5 General notes on the injection system

Repairing ignition ➔ [“1 Repairing ignition”, page 216](#)

- ◆ The engine control unit is equipped with a self-diagnosis system. Before repairs and also for fault finding, first of all interrogate the event memory. Also check the vacuum hoses and connections (unmetered air).
- ◆ Fuel hoses in the engine compartment must be secured with spring band clamps. The use of clamp-type or screw-type clips is not allowed.
- ◆ A minimum voltage of 11.5 V is required for perfect functioning of the electrical components.
- ◆ Do not use sealants containing silicone. Traces of silicone elements drawn in by the engine are not burnt in the engine and damage the lambda probe.
- ◆ Certain inspections may cause the control unit to detect and store a fault. It is therefore necessary to interrogate the event memory after having completed all inspections and repairs, and if necessary delete ➔ **Vehicle diagnostic tester**.

Safety measures

➔ [“2.4 Safety measures to apply when working on the fuel injection and ignition system”, page 11](#)

2.6 General notes on the ignition system

- ◆ Switch off the ignition before disconnecting and connecting the battery, as this may damage the 4AV control unit.
- ◆ The engine control unit and further components are equipped with self-diagnosis; inspect ➔ **Vehicle diagnostic tester**.
- ◆ A minimum voltage of 11.5 V is required for perfect functioning of the electrical components.
- ◆ Certain inspections may cause the control unit to detect and store a fault. It is therefore necessary to interrogate the event memory after having completed all inspections and repairs, and if necessary delete ➔ **Vehicle diagnostic tester**.

Safety measures

➔ [“2.4 Safety measures to apply when working on the fuel injection and ignition system”, page 11](#)

Setting data, spark plugs ➔ Maintenance ; Booklet Octavia II.

2.7 Additional instructions when undertaking assembly work on the air-conditioning system



WARNING

Do not open the refrigerant circuit of the air conditioning system.



Note

In order to avoid damage to the condenser as well as to the refrigerant lines and hoses, ensure that the lines and hoses are not over-tensioned, kinked or bent.

Steps which should be taken in order to remove and install the engine without opening the refrigerant circuit:

- Remove the holding clamp(s) of the coolant lines.
- Remove AC compressor ⇒ Heating, Air Conditioning; Rep. gr. 87 .
- Mount the AC compressor in such a way that the refrigerant lines/hoses are not under tension.

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10 – Removing and installing engine

1 Removing and installing engine

⇒ [“1.1 Removing”, page 14](#)

⇒ [“1.2 Securing the engine to the assembly stand”, page 21](#)

⇒ [“1.3 Install”, page 22](#)

1.1 Removing

Special tools and workshop equipment required

- ◆ Catch pan , e.g. -VAS 6208-
- ◆ Engine and gearbox jack . e.g. -V.A.G 1383 A-
- ◆ Pliers for spring strap clamps
- ◆ Double ladder
- ◆ Engine mount - T10012-
- ◆ Assembly stand - MP 9-101-
- ◆ Engine and gearbox support - MP 1-202-
- ◆ Supporting device - T30099-
- ◆ Surface - T30099/1-
- ◆ Workshop crane , e.g. -VAS 6100-



Caution

Observe all safety measures and notes for assembly work on the fuel system, on the injection-, ignition-, and in particular, the compressed natural gas system, and on the charge air system as well as rules for cleanliness
⇒ [“2 Safety instructions”, page 3](#) .

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#) .



Note

- ◆ *The engine is removed downwards together with the gearbox.*
- ◆ *All cable straps that have been loosened or cut open when the engine was removed must be attached again in the same location when the engine is installed again.*
- ◆ *Collect drained coolant in a clean container for reuse or proper disposal.*



Caution

When undertaking all installation work, particularly in the engine compartment due to its cramped construction, please observe the following:

- ◆ *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, the active charcoal container-unit, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- ◆ *In order to avoid damage to the cables, ensure that there is adequate free access to all moving or hot components.*

- If present, remove engine cover -arrows-.



WARNING

Observe measures when disconnecting the battery ⇒ Electrical System; Rep. gr. 27 .

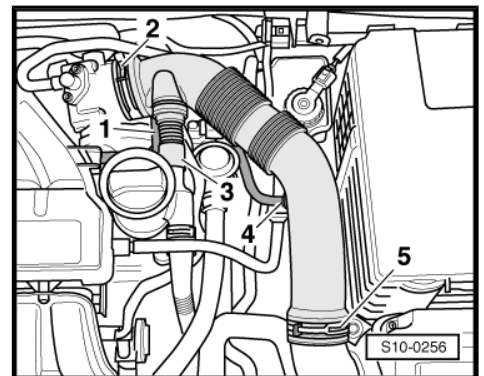
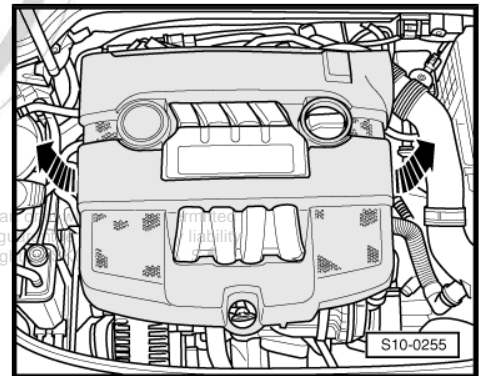
- Disconnect the earth strap from the battery with the ignition off.



WARNING

Hot steam or hot coolant may escape when the compensation bottle is opened. Cover the cap with a cloth and open carefully.

- Open the cap of the coolant expansion reservoir.
- Remove both front wheels.
- Remove the sound dampening system ⇒ Body Work; Rep. gr. 50 .
- Remove the right and left wheelhouse liner ⇒ Body Work; Rep. gr. 66 .
- Separate plug connection at coolant temperature sender at radiator outlet -G83- .
- Drain coolant
⇒ ["1.7 Draining and filling up coolant", page 105](#) .
- Pull off intake air duct at the bottom of the container with pre-cubic contents.
- Disconnect hoses -1-, -3- and -4-.
- Remove the air guide hose, to do so release spring strap clamps -2- and -5-.





- Pull off hoses -1- and -2- at air filter housing.
- Unscrew bolt -3-.
- Remove the air filter housing.
- Pull off intake air duct to container with pre-cubic contents from lock carrier and take out.
- Remove battery ⇒ Electrical System; Rep. gr. 27 .

For vehicles with engine identification characters manufactured up to 12.2010 (exhaust emission standard EU-4)

- Remove liquefied petroleum gas control unit
⇒ [“3.2 Removing and installing liquefied petroleum gas control unit \(for LPG vehicles\)”, page 199](#) .

Continued for all vehicles

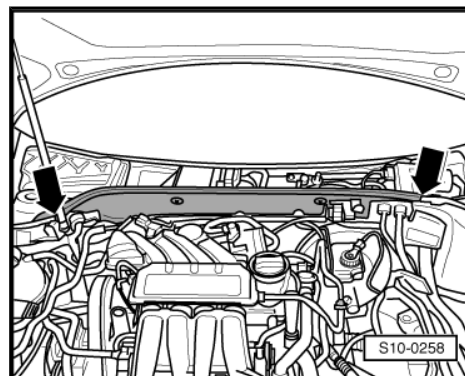
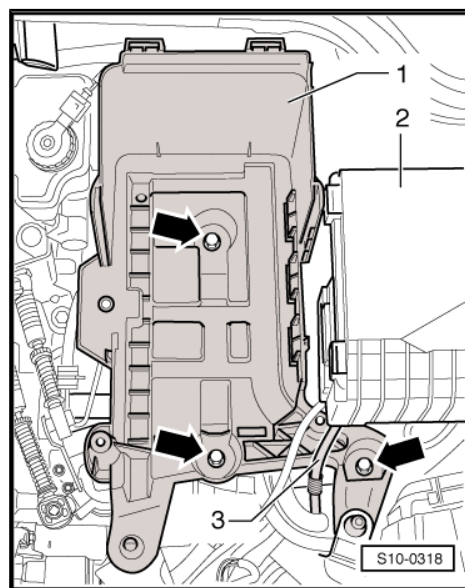
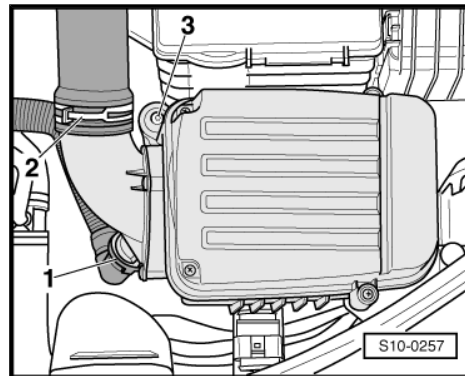
- Remove battery tray ⇒ Electrical System; Rep. gr. 27 .



Note

On LPG vehicles (engine identification characters CHGA) spacer washers of 4 mm thickness are fitted between the battery tray and the body below the front screws -bottom arrows-.

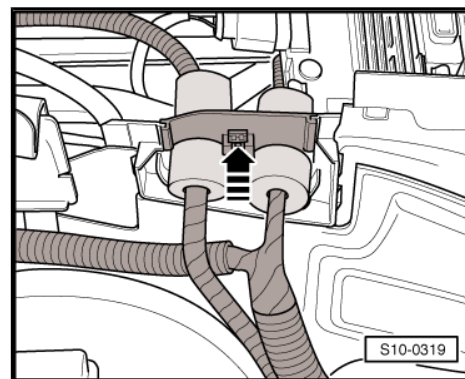
- Remove the cooling water tank cover ⇒ Body Work; Rep. gr. 66 .
- Expose the engine wiring harness at the rear on the bulkhead plenum chamber.



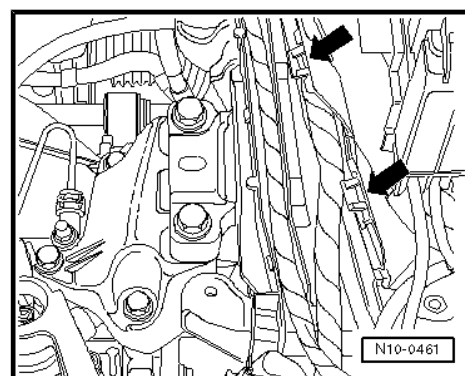
- Remove bulkhead plenum chamber -arrows-.
- Disconnect the plug of the engine wiring harness from the engine control unit
⇒ [“3.1 Removing and installing engine control unit J361”, page 197](#) .



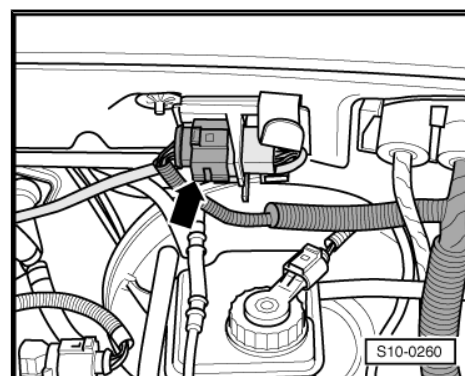
- Release duct for engine wiring harness -arrow- and pull out upwards.
- Expose the left engine wiring harness at the rear on the bulk-head plenum chamber.



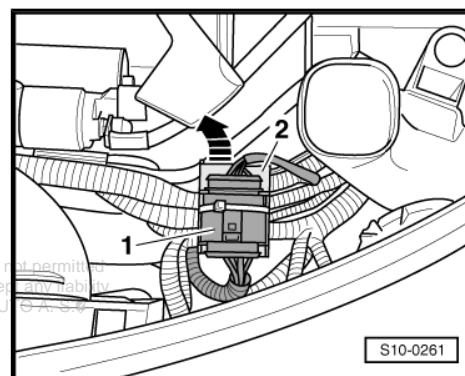
- Open the bracket of the cable guide -arrows-.



- Remove the plug connection -arrow- for the lambda probe - G39- (upstream of catalytic converter) from the bracket and disconnect.
- Open bracket of cable guide.

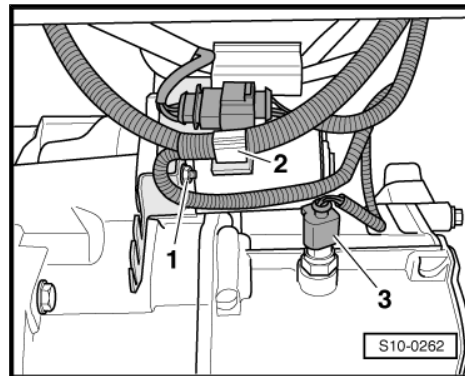


- Expose the plug connection -1- and disconnect it.
- Open the bracket -2- lying below the cable guide.
- Take engine wiring harness for control unit out of the cable guide.
- Unscrew earth cables and cables at starter.



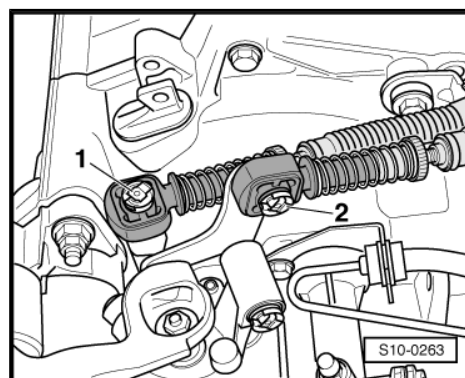
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- Disconnect the plug connection -3- for the reversing light switch.
- Expose the engine wiring harness on the mounting bracket -2-.
- Release nut -1- and remove bracket with electrical cables from threaded bore.
- Separate the plug connection at the secondary air pump motor -V101-.
- Expose cable.
- Detach the coolant hoses to the heat exchanger at the bulkhead.
- Disconnect the vacuum line from the brake servo unit at the intake manifold.

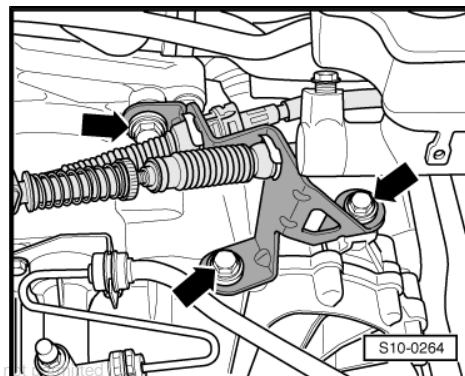


For vehicles with manual gearbox

- Unclip lock washers -1- and -2- on both control cables.
- Remove cable locks from gearbox shift lever and relay lever.



- Disconnect cable support from gearbox and lay aside -arrows-.
- Remove the slave cylinder and lay aside, do not open the line system.



WARNING

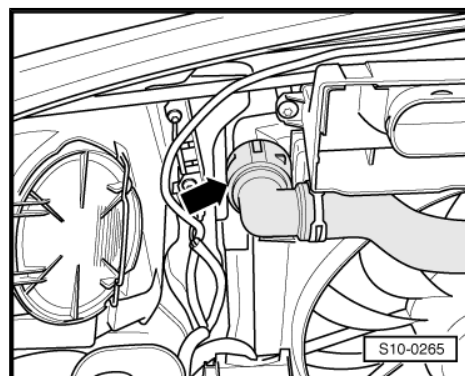
After removing the slave cylinder, do not depress the clutch pedal.

For vehicles with automatic gearbox

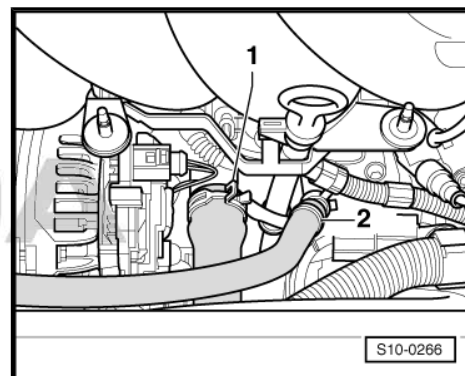
- Remove shift mechanism from gearbox ⇒ Automatic Gearbox; Rep. gr. 37.

Continued for all vehicles

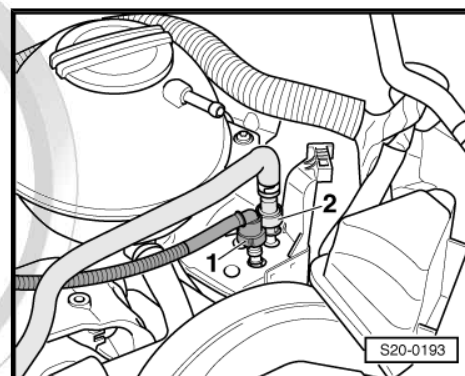
- Detach top coolant hose from the radiator -arrow-.



- Detach coolant hoses -1- and -2-.
- Detach coolant hose at expansion reservoir.
- Disconnect the vacuum hose to the activated charcoal filter.



- Remove fuel feed line -2-
⇒ [“4 Separating push-on couplings”, page 164](#).
- Disconnect the vacuum hose -1- to the activated charcoal filter, to do so press the unlocking button.
- Pull activated charcoal filter with its attached lines to the top out of the bracket.



For vehicles with engine identification characters CHGA



WARNING

When loosening the gas line, gas may escape. Wear safety goggles and safety clothing, in order to avoid eye injuries and burns. Cover the connection points with a cloth and open carefully.

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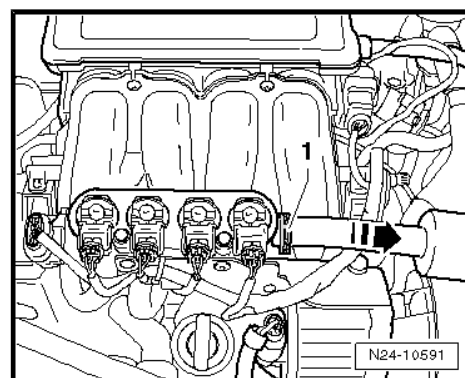
- Empty gas line
⇒ [“2.3 Emptying and filling up gas line”, page 144](#).
- Loosen clamp -1- and detach the hose from the gas distributor in -direction of arrow-.

Continued for all vehicles

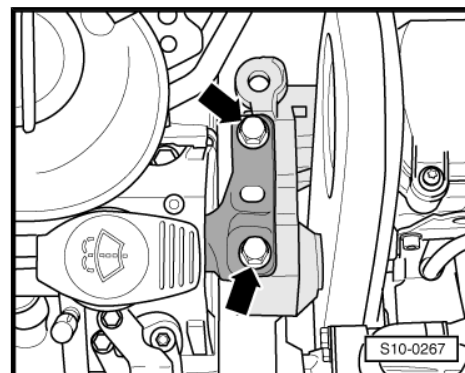


Note

Mark the direction of rotation with chalk or a felt-tip pen before removing the V-ribbed belt. Reversing the rotation direction of an already used belt may destroy it.



- Remove V-ribbed belt
⇒ [“1.2 Removing and installing V-ribbed belt”, page 34](#).
- Remove the generator ⇒ Electrical System; Rep. gr. 27.
- Unscrew screws -arrows- of assembly bracket at engine by about 2 turns.





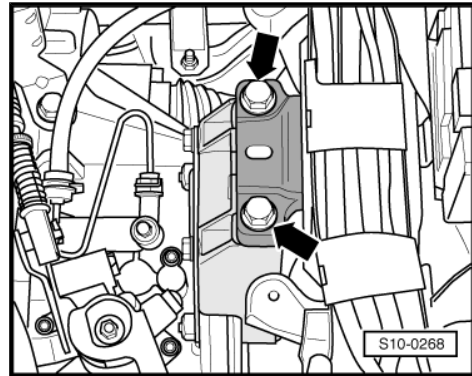
- Unscrew screws -arrows- of assembly bracket at gearbox by about 2 turns.

Vehicles with air conditioning



WARNING

Do not open the refrigerant circuit of the air conditioning system.



Note

In order to avoid damage to the AC compressor as well as to the refrigerant lines and hoses, ensure that the lines and hoses are not over-tensioned, kinked or bent.

- Remove AC compressor from the bracket
⇒ [“1.1 Assembly overview - V-ribbed belt”, page 32](#) .
- Tie up AC compressor with connected refrigerant hoses to the front bumper.

Continued for all vehicles

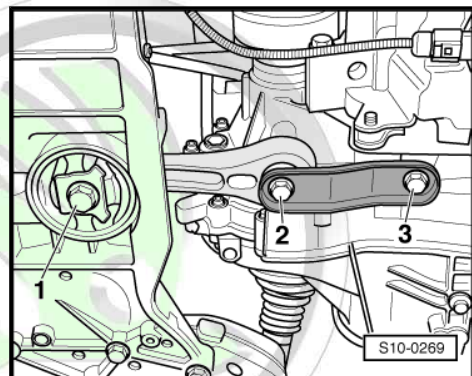
- Disconnect plug connection at oil level and oil temperature sender -G266- .
- Remove pre-exhaust pipe
⇒ [“1.3 Removing and installing pre-exhaust pipe with catalytic converter”, page 204](#) .



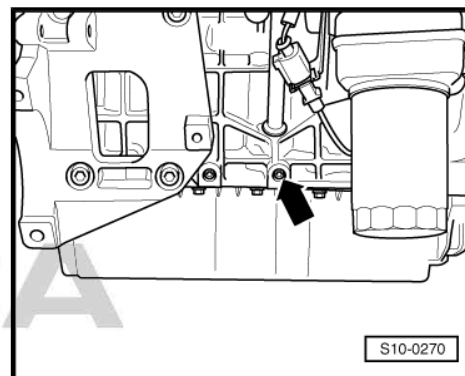
Note

The decoupling elements in the pre-exhaust pipe should not be bent by more than 10° - risk of damage.

- Unscrew the left drive shaft from the gearbox flange and tie up to the top.
- Remove drive shaft to the right ⇒ Chassis; Rep. gr. 40 .
- Release screws -1 ... 3- and remove pendulum support.



- Unscrew front sealing screw -arrow- at cylinder block.



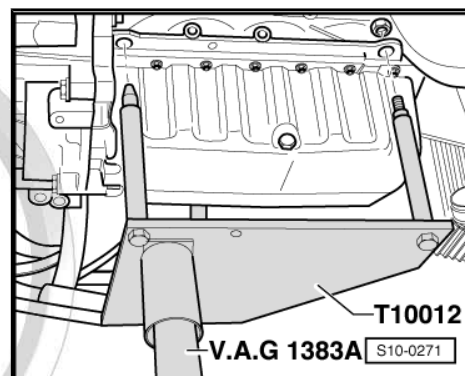
- Screw engine mount -T10012- to the cylinder block with fixing nut and bolt to approx. 20 Nm.
- Insert engine/gearbox jack at engine mount -T10012- and slightly raise.



Note

Use the double ladder to release the screws for the assembly bracket.

- Release screws for assembly bracket at engine and at gearbox.



Note

- ◆ *Check whether all hose and line connections between engine, gearbox and body are released.*
- ◆ *When lowering carefully guide the engine/gearbox assembly, in order to avoid damage.*

- Pull engine/gearbox unit as far forward as possible and lower slowly downwards.

1.2 Securing the engine to the assembly stand



Note

The assembly stands - MP9-101- can be used with engine mount - MP1-202- or the assembly stands - VAS 6095- for fastening.

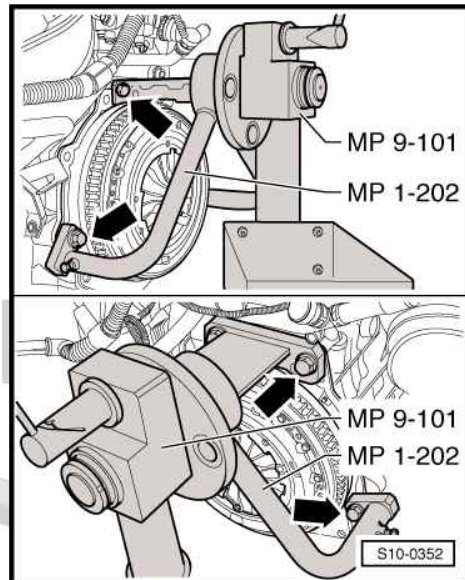
Securing the engine to the assembly stands - MP9-101-

Special tools and workshop equipment required

- ◆ Lifting device - MP9-201 (2024 A)-
- ◆ Engine bracket - MP 1-202-
- ◆ Assembly stand - MP 9-101-
- ◆ Workshop crane , e.g. -VAS 6100-
- Unbolt gearbox from engine ⇒ Gearbox ⇒ Rep. gr. 34 .



- Screw engine mount - MP 1-202- to engine and secure to the assembly stand - MP 9-101- .



1.3 Install

Work procedure

- Engine mounted on engine mount -T10012 - .



Caution

Observe all safety measures and notes for assembly work on the fuel system, on the injection-, ignition-, and in particular, the compressed natural gas system, and on the charge air system as well as rules for cleanliness ⇒ "2 Safety instructions", page 3 .

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG) ⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8 .

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Installation is performed in the reverse order, pay attention to the following points:



Note

- ◆ *When performing installation work replace the self-locking nuts.*
- ◆ *Replace screws which have been tightened to a torquing angle as well as gasket rings and seals.*
- ◆ *All cable straps should be fastened again in the same place when installing.*
- ◆ *Secure all hose connections with hose clamps ⇒ Electronic Catalogue of Original Parts .*
- ◆ *Clean the drive shaft serration and hub serration on used clutch discs, remove corrosion. Apply a very thin layer of grease -G 000 100- onto the serration. Subsequently move the clutch disc up and down on the drive shaft until the hub fits smoothly on the shaft. Remove all excess grease.*



Caution

When undertaking all installation work, particularly in the engine compartment due to its cramped construction, please observe the following:

- ◆ Lay lines of all kinds (e.g. for fuel, hydraulic fluid, the active charcoal container-unit, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.
- ◆ In order to avoid damage to the cables, ensure that there is adequate free access to all moving or hot components.

- Check whether the dowel sleeves for centering the engine/gearbox are present in the cylinder block; insert if necessary.
- Ensure that the intermediate plate has been inserted on the sealing flange and is pushed onto the dowel sleeves -arrows-.

For vehicles with manual gearbox

- Check the centering of the clutch disc ⇒ Gearbox; Rep. gr. 30 .
- Check clutch release bearing for wear and renew if necessary.

For vehicles with automatic gearbox

- Replace the needle bearing -arrow- in the crankshaft ⇒ **"3.2 Replace needle bearing for crankshaft", page 54**
- Attach the selector lever control cable at the gearbox ⇒ Gearbox; Rep. gr. 34 .

Continued for all vehicles

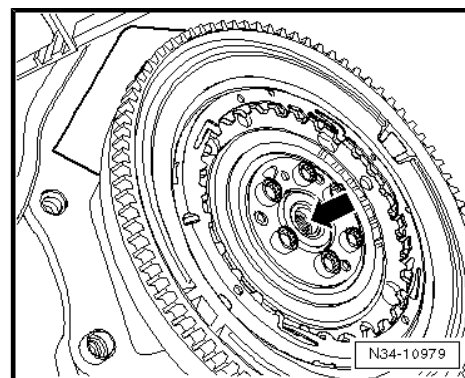
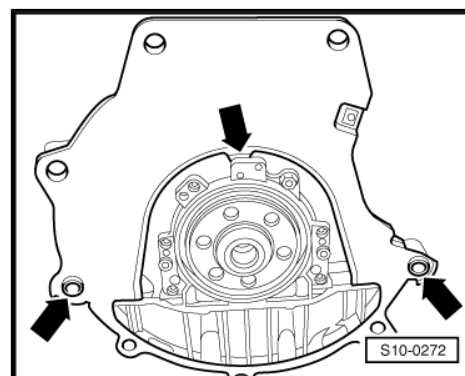
- Secure gearbox to engine.
- Insert engine/gearbox assembly in the body.
- First of all tighten screws for assembly bracket at engine and at gearbox by hand.
- Use new screws for attaching.



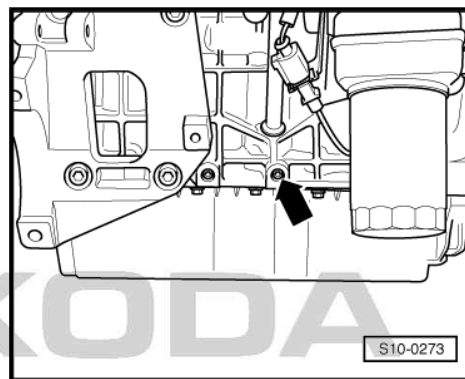
Note

The screws are tightened to a final torque only when adjusting the engine mounting.

- Unscrew -T10012- engine mount from engine.



- Insert sealing screw -arrow- with locking agent -D 000 600 A2- .
- Tighten pendulum support to the gearbox and to the assembly carrier.
- Install drive shafts ⇒ Chassis; Rep. gr. 40 .
- Install exhaust system and align free of stress
⇒ ["1.6 Aligning exhaust system free of stress", page 209](#) .
- Install AC compressor
⇒ ["1.1 Assembly overview - V-ribbed belt", page 32](#) .



For vehicles with manual gearbox

- Install the slave cylinder of the hydraulic clutch control ⇒ Gearbox; Rep. gr. 30 .
- Attach shift mechanism to gearbox and adjust ⇒ Gearbox; Rep. gr. 34 .

Continued for all vehicles

- To facilitate the positioning of the generator, drive the bushings for the fixing screws slightly backwards
- Install generator ⇒ Electrical System; Rep. gr. 27 .
- Install the V-ribbed belt
⇒ ["1.2 Removing and installing V-ribbed belt", page 34](#) .
- Adjust engine mounting
⇒ ["2.2 Checking and adjusting the assembly bracket", page 28](#) .
- Electrical connections and proper routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install windscreen wiper arms ⇒ Electrical System; Rep. gr. 92 .

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- Install battery tray ⇒ Electrical System; Rep. gr. 27 .

i Note

On LPG vehicles (engine identification characters CHGA) spacer washers of 4 mm thickness are fitted between the battery tray and the body below the front screws -bottom arrows-.

For vehicles with engine identification characters CHGA manufactured up to 12.2010 (emission level EU-4)

- Install liquefied petroleum gas control unit
⇒ [“3.2 Removing and installing liquefied petroleum gas control unit \(for LPG vehicles\)”](#), page 199 .

Continued for all vehicles

- Install battery ⇒ Electrical System; Rep. gr. 27 .
- Venting air from the fuel system
⇒ [“1.9 Venting air from the fuel system”](#), page 139 .
- Checking the oil level ⇒ Maintenance ; Booklet Octavia II .
- Top up coolant
⇒ [“1.7 Draining and filling up coolant”](#), page 105 .

i Note

- ◆ *Do not use drained coolant again, if the cylinder head or cylinder block was replaced.*

- ◆ *Dirty coolant must not be used again.*

- Interrogate all event memories and delete all event entries which are caused by removing and installing the engine ⇒ Vehicle diagnostic tester.

After deleting the event memory of the engine control unit the readiness code must be re-generated.

For vehicles with engine identification characters CHGA

- Fill up gas line
⇒ [“2.3 Emptying and filling up gas line”](#), page 144 .
- After installing the engine, carry out a leak tightness test on the natural gas system ⇒ Maintenance ; Booklet Octavia II .



Caution

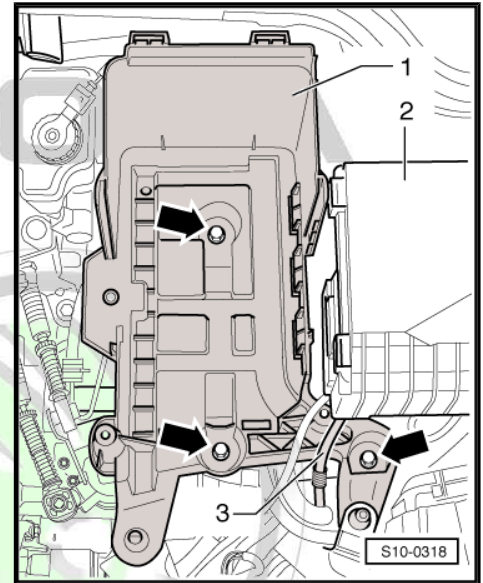
Check the hose connections for leak tightness, e.g. with a gas leakage detector for natural gas vehicles - VAS 6227- .

For vehicles with engine identification characters manufactured up to 12.2010 (exhaust emission standard EU-4)

- Query and erase event memory of the LPG control unit
⇒ [“2.1 Connecting the diagnostic unit, querying and erasing the event memory of the liquefied petroleum gas system \(LPG\)”](#), page 3 .

For vehicles with engine identification characters CHGA manufactured from 01.2011 (emission level EU-5)

- Querying and erasing event memory of engine control unit
⇒ Vehicle diagnostic tester.





Continued for all vehicles

- Perform a test drive.
- Then perform a vehicle system test and if necessary eliminate the resulting faults.

Tightening torques

Component		Nm
Screws/nuts	M6	9
	M7	13
	M8	20
	M10	40
	M12	70
In variation of this:		
Sealing screw in cylinder block		10 ¹⁾
Screws for assembly bracket		⇒ “2.1 Assembly overview - assembly mountings”, page 27
Engine/gearbox screws ⇒ Gearbox; Rep. gr. 34		

¹⁾ Insert with a locking agent -D 000 600 A2- .

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2 Assembly bracket

⇒ [“2.1 Assembly overview - assembly mountings”, page 27](#)

⇒ [“2.2 Checking and adjusting the assembly bracket”, page 28](#)

2.1 Assembly overview - assembly mountings

1 - Engine support bracket

2 - Screw

- ☐ 45 Nm

3 - Engine mounting

4 - Screw

- ☐ Replace after disassembly
- ☐ 40 Nm + 90°

5 - Support

6 - Screw

- ☐ Replace after disassembly
- ☐ 20 Nm + 90°

7 - Screw

- ☐ Replace after disassembly
- ☐ 20 Nm + 90°

8 - Screw

- ☐ Replace after disassembly
- ☐ 40 Nm + 90°

9 -

- ☐ Replace after disassembly
- ☐ 60 Nm + 90°

10 - Pendulum support

- ☐ Removing: First, unscrew the screw -11-, then screws -12-.
- ☐ Installing: First tighten the screw -12-, then screw -11-.

11 - Screw

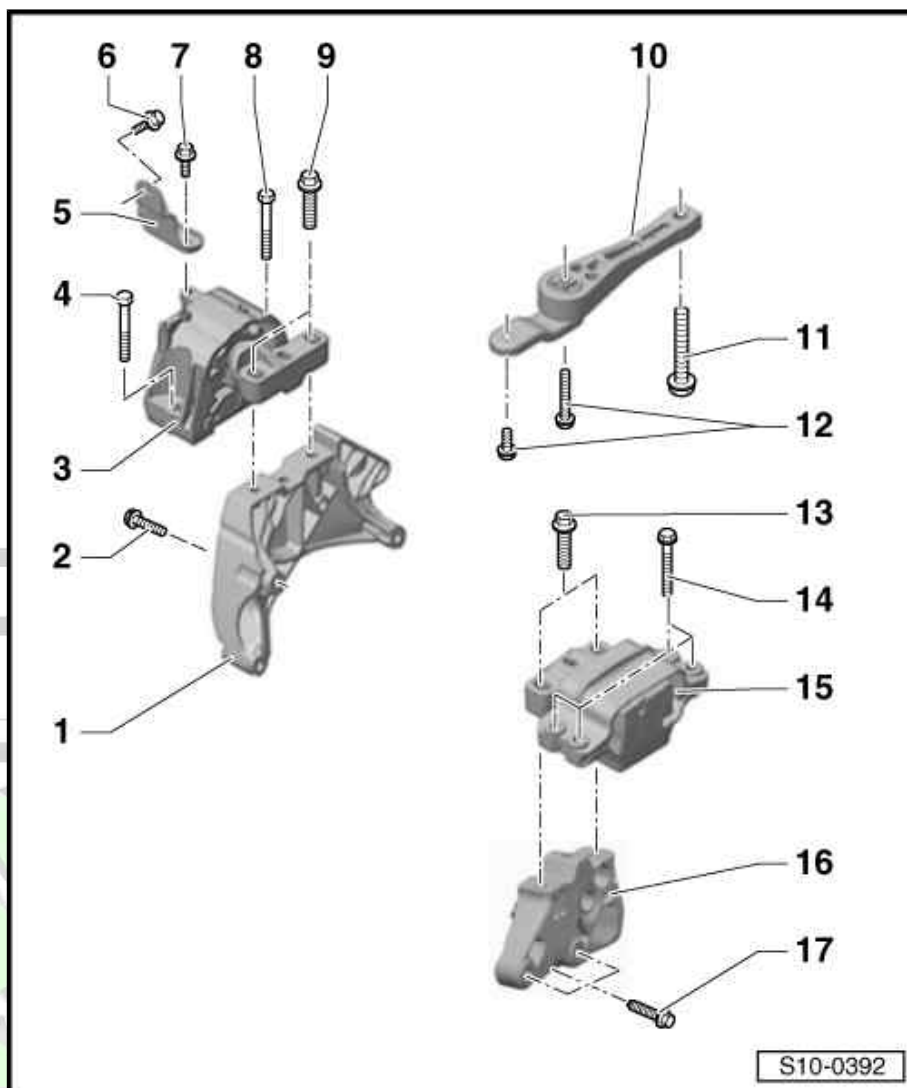
- ☐ Replace after disassembly
- ☐ 100 Nm + 90°

12 - Screws

- ☐ Replace after disassembly
- ☐ Strength category 8.8: 40 Nm + 90°
- ☐ Strength category 10.9: 50 Nm + 90°

13 - Screw

- ☐ Replace after disassembly
- ☐ 60 Nm + 90°





14 - Screw

- ☐ Replace after disassembly
- ☐ 40 Nm + 90°

15 - Gearbox mount

16 - Gearbox support bracket

17 - Screw

- ☐ Tightening torque ⇒ Gearbox; Rep. gr. 34

2.2 Checking and adjusting the assembly bracket

⇒ [“2.2.1 Check setting”, page 28](#)

⇒ [“2.2.2 Adjusting the unit mounting”, page 28](#)

2.2.1 Check setting

- Check dimensions on the right hanger for engine and gearbox:
- Both bolt heads -2- must be positioned parallel to the edge of the supporting arm -3- for engine mount.
- Between engine bracket -1- and engine support -4- there must be a distance -x- = 10...13 mm.

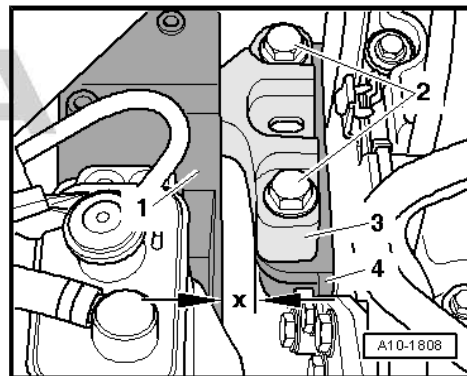


Note

The distance -x- can be checked, for example with suitable round bars.

Only if there is an acoustic complaint (engine or gearbox knock on the frame side rail when cornering) and the dimension -a- is not 10...13 mm:

- Adjust the assembly bracket
⇒ [“2.2.2 Adjusting the unit mounting”, page 28](#) .



2.2.2 Adjusting the unit mounting

Special tools and workshop equipment required

◆ Supporting device - T30099-

◆ Surface - T30099/1-

◆ Adapter - MP9-200/3 (10-222A/3)-

◆ Lifting eye - 10-222A/12-

◆ Snap hook

- Remove battery ⇒ Electrical System; Rep. gr. 27 .

For vehicles with engine identification characters manufactured up to 12.2010 (exhaust emission standard EU-4)

- Remove liquefied petroleum gas control unit
⇒ [“3.2 Removing and installing liquefied petroleum gas control unit \(for LPG vehicles\)”, page 199](#) .

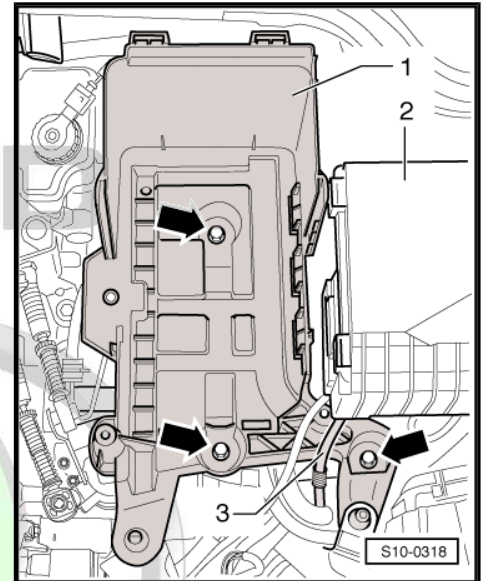
Continued for all vehicles

- Remove battery tray ⇒ Electrical System; Rep. gr. 27 .

i Note

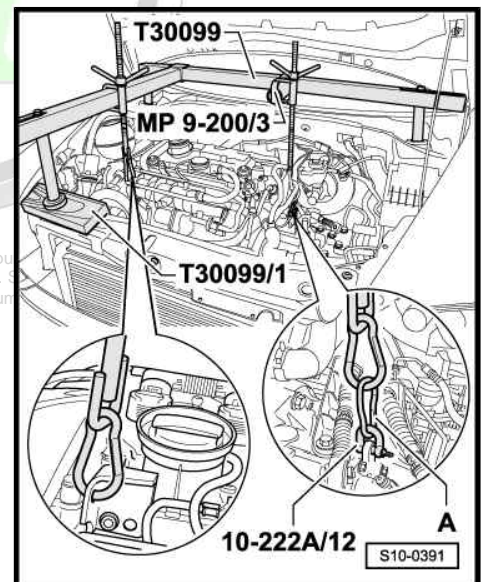
On LPG vehicles (engine identification characters CHGA) spacer washers of 4 mm thickness are fitted between the battery tray and the body below the front screws -bottom arrows-.

- Remove the cooling water tank cover ⇒ Body Work; Rep. gr. 66 .

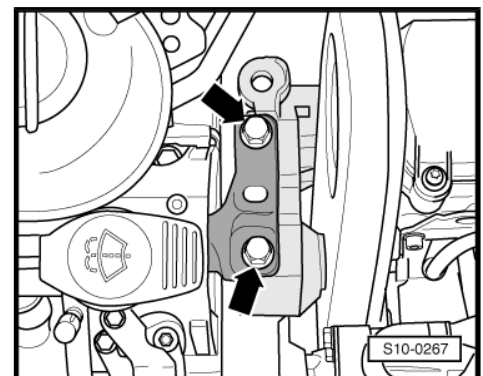


- Install supporting device - T30099- and support engine in fitting position.
- Uniformly pre-tension the engine/gearbox unit with both spindles, but do not raise.

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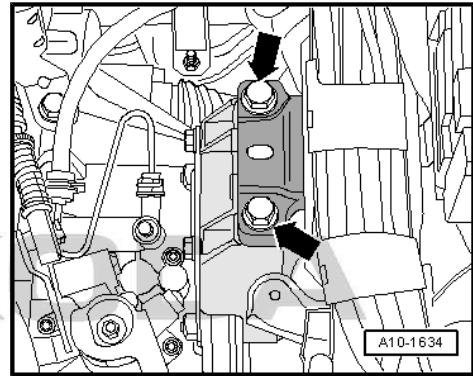


- Release the screws -arrows- of the assembly bracket at the engine.





- Slightly loosen the screws -arrows- of the assembly bracket at the gearbox (less than 1 revolution).
- Successively replace all the screws (as long as it has not already been performed when installing the engine) and insert these loosely.

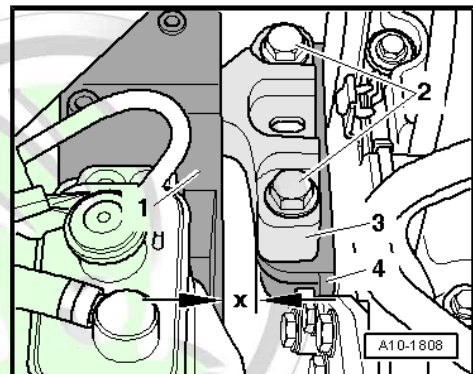


- Move the engine/gearbox assembly with an assembly lever between engine support -1- and supporting arm -3- for engine mount until the following dimensions are set:
 - Both bolt heads -2- must be positioned parallel to the edge of the supporting arm -3- for engine mount.
 - Between engine bracket -1- and engine support -4- there must be a distance -x- = 10 mm.



Note

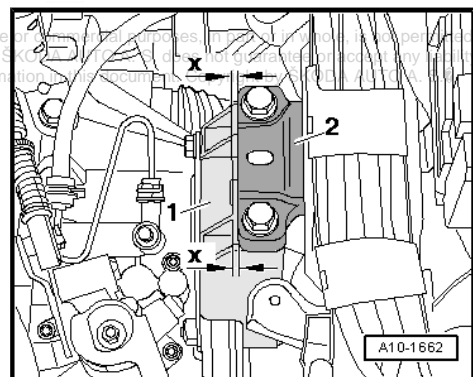
The distance -x- can be checked, for example with suitable round bars.



- Tighten the screws for the engine side assembly bracket
⇒ [“2.1 Assembly overview - assembly mountings”, page 27](#) .
- Make sure that on the gearbox side the edges of the supporting arm -2- and gearbox support -1- are parallel.
- The dimension -x- must be the same on both mount sides.
- Tighten the screws for the gearbox side assembly bracket
⇒ [“2.1 Assembly overview - assembly mountings”, page 27](#) .

Install

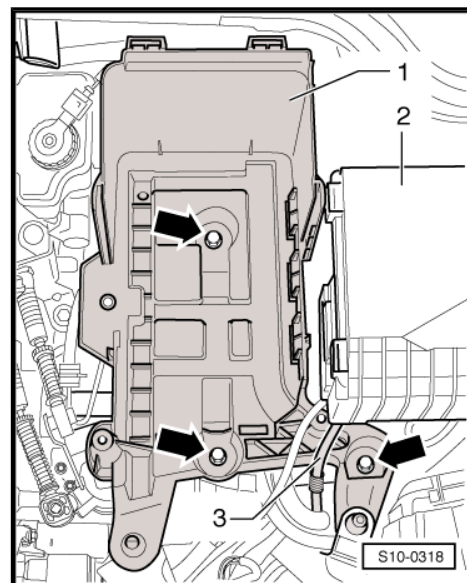
Installation is performed in the reverse order, pay attention to the following points:





Note

On LPG vehicles (engine identification characters CHGA) spacer washers of 4 mm thickness are fitted between the battery tray and the body below the front screws -bottom arrows-.



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13 – Crankshaft group

1 Removing and installing a V-ribbed belt and a toothed belt

⇒ [“1.1 Assembly overview - V-ribbed belt”, page 32](#)

⇒ [“1.2 Removing and installing V-ribbed belt”, page 34](#)

⇒ [“1.3 Summary of components - toothed belt”, page 35](#)

⇒ [“1.4 Removing and installing toothed belt”, page 36](#)

⇒ [“1.5 Checking semi automatic toothed belt tensioning pulley”, page 42](#)

1.1 Assembly overview - V-ribbed belt

1 - Belt pulley

- ☐ for the V-ribbed belt

2 - Screw

- ☐ Replace after disassembly
- ☐ 10 Nm + 90°

3 - Screw

- ☐ 23 Nm

4 - Tensioning device for V-ribbed belt

- ☐ swivel tensioning device for V-ribbed belt with open-end wrench to slacken the V-ribbed belt
- ☐ Secure tensioning device with a hexagon wrench

5 - Bracket for auxiliary units

6 - Support

7 - Generator

- ☐ removing and installing
⇒ Electrical System;
Rep. gr. 27
- ☐ to facilitate the positioning of the generator, drive the threaded bushings for fixing screws at the generator slightly backwards

8 - Screw

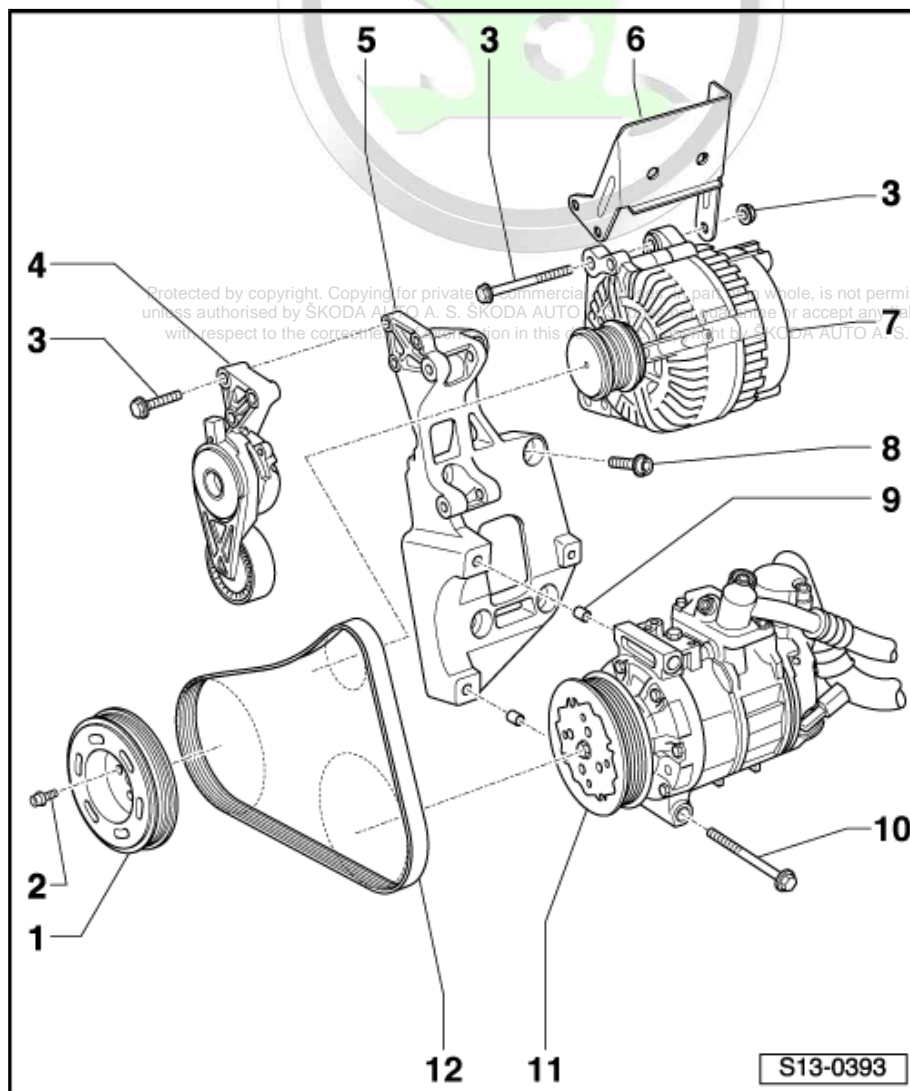
- ☐ Replace after disassembly

- ☐ observe the order of tightening up
⇒ [Fig. “Bolts at bracket for auxiliary units - tightening sequence””, page 33](#)

- ☐ 45 Nm

9 - Bushing

- ☐ 2 pieces



10 - Screw

- ❑ 25 Nm

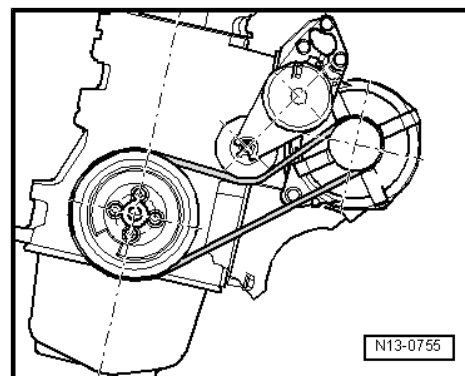
11 - AC compressor

- ❑ removing and installing ⇒ Heating, Air Conditioning; Rep. gr. 87

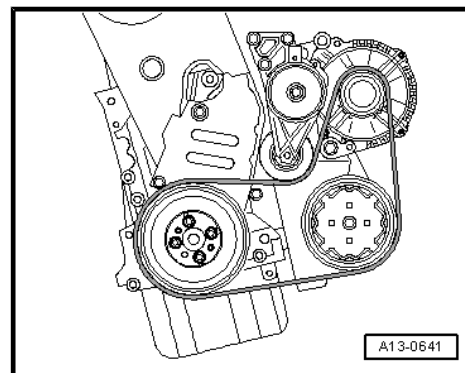
12 - V-ribbed belt

- ❑ mark the direction of rotation with chalk or a felt-tip pen before removing
- ❑ check for wear
- ❑ do not kink
- ❑ removing and installing ⇒ [“1.2 Removing and installing V-ribbed belt”, page 34](#)
- ❑ Routing of the V-ribbed belt without AC compressor ⇒ [page 33](#)
- ❑ Routing of the V-ribbed belt with AC compressor ⇒ [page 33](#)

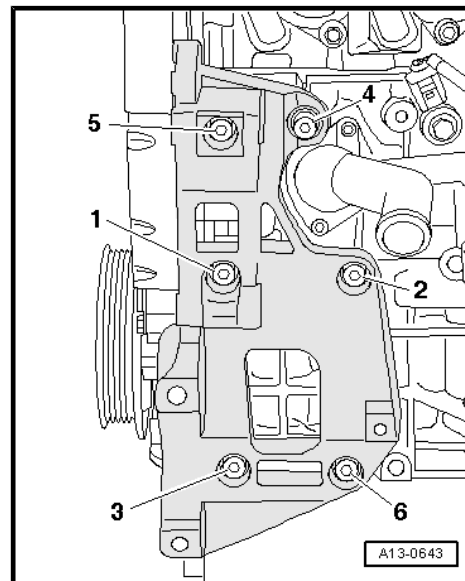
Routing of the V-ribbed belt without AC compressor



Routing of the V-ribbed belt with AC compressor



Bolts at bracket for auxiliary units - tightening sequence





1.2 Removing and installing V-ribbed belt

Removing

Special tools and workshop equipment required

- ◆ Locking pin - T10060A-

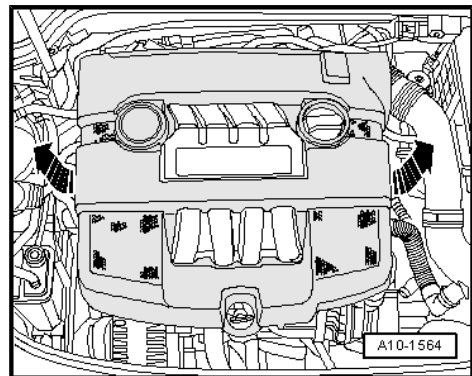


Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8.

- If present, remove engine cover -arrows-.

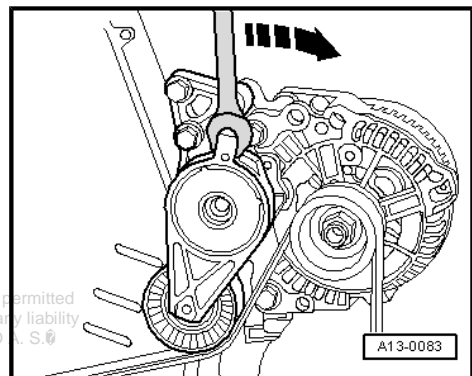
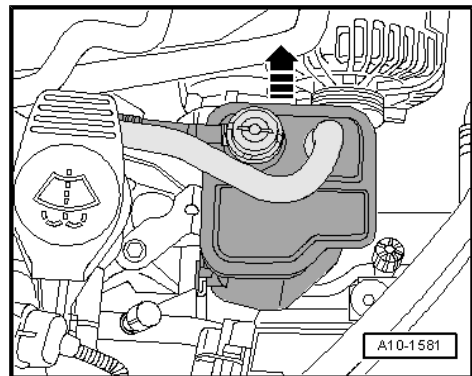


- Pull activated charcoal filter with its attached lines to the top out of the bracket and place to the side.



Note

- ◆ Mark the direction of rotation with chalk or a felt-tip pen before removing the V-ribbed belt. Reversing the rotation direction of an already used belt may destroy it.
- ◆ Swing the tensioning device in -the direction of the arrow- to detension the V-ribbed belt.
- Swing the tensioning device in -the direction of the arrow- to detension the V-ribbed belt.



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- Lock the tensioning element with the locking pin -T10060A- or with the hexagon wrench.
- Remove the release ribbed V-belt.

Install

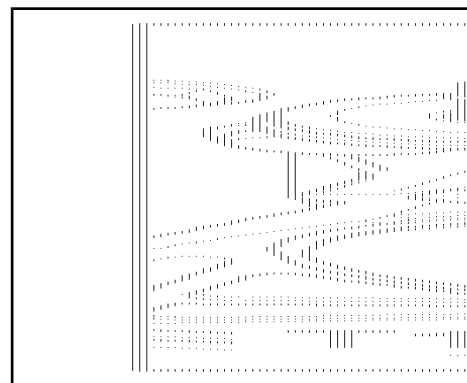
Installation is performed in the reverse order, pay attention to the following points:



Note

Before fitting the V-ribbed belt make sure that all assemblies (generator and AC compressor) are securely mounted.

- Position the V-ribbed belt on the belt pulleys of the crankshaft and AC compressor.
- Position the ribbed V-belt on the belt pulley last, release the tensioning device.
- Check correct positioning of the V-ribbed belt.
- Start engine and check belt run.



1.3 Summary of components - toothed belt

1 - Screw

- ☐ insert using locking agent -D 000 600 A2-
- ☐ 10 Nm

2 - Middle toothed belt guard

3 - Engine support bracket

4 - Screw

- ☐ 45 Nm

5 - Top toothed belt guard

- ☐ removing and installing
⇒ ["1.4 Removing and installing toothed belt", page 36](#)

6 - Nut

- ☐ 23 Nm

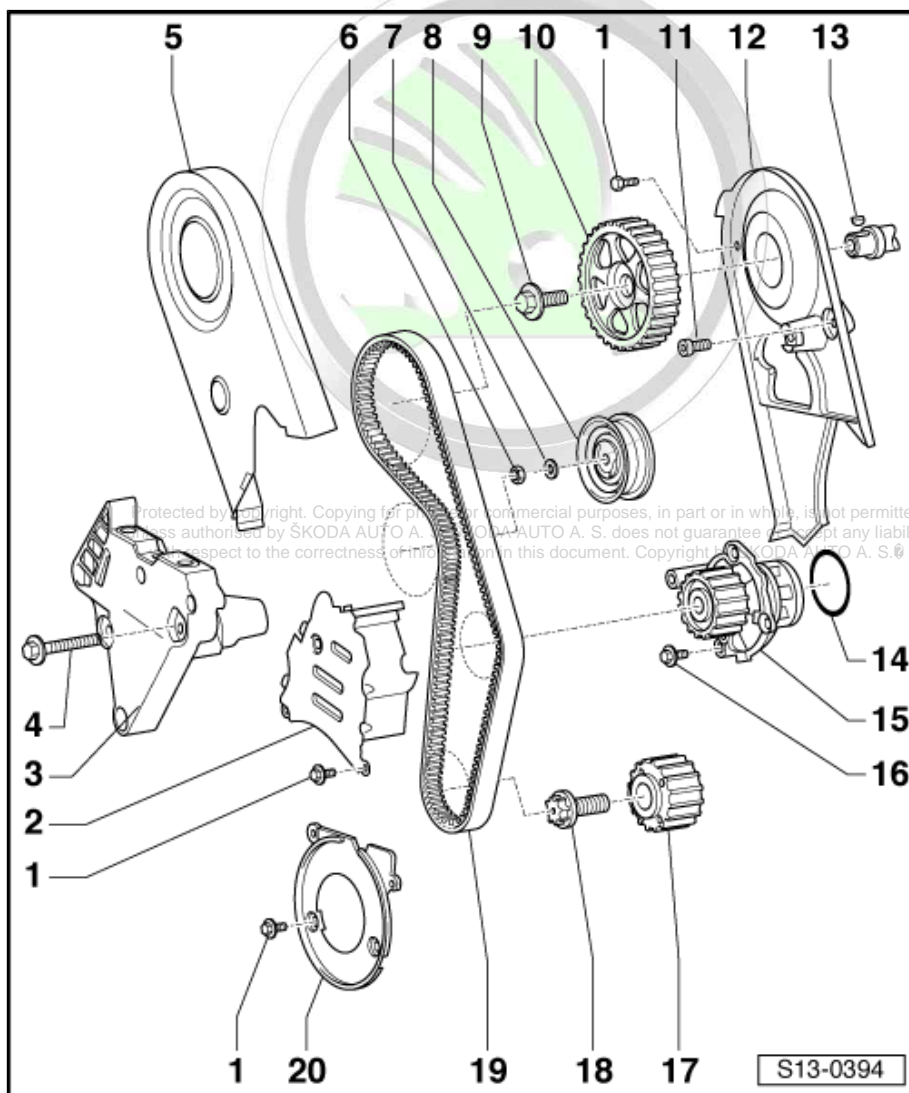
7 - Washer

8 - Semi-automatic tensioning pulley

- ☐ check
⇒ ["1.5 Checking semi automatic toothed belt tensioning pulley", page 42](#)
- ☐ Fitting position
⇒ ["1.4 Removing and installing toothed belt", page 36](#)

9 - Screw

- ☐ to release and tighten use the counterholder - T30004 (3415)-





- ☐ 100 Nm

10 - Camshaft sprocket

- ☐ for removal and installation, remove toothed belt
⇒ ["1.4 Removing and installing toothed belt", page 36](#)
- ☐ Installation position fixed by woodruff key -13- ⇒ [Item 13 \(page 36\)](#)

11 -

- ☐ insert using locking agent -D 000 600 A2-
- ☐ 23 Nm

12 - Rear toothed belt guard

13 - Woodruff key

- ☐ check tightness

14 - O-ring

- ☐ Replace after disassembly

15 - Coolant pump

- ☐ removing and installing ⇒ ["1.8 Removing and installing coolant pump", page 108](#)

16 - Screw

- ☐ 15 Nm

17 - Crankshaft - toothed belt sprocket

- ☐ there must not be any oil present on the contact surface between the toothed belt sprocket and the crankshaft
- ☐ can be installed only in one position

18 - Screw

- ☐ Replace after disassembly
- ☐ do not oil
- ☐ to release and tighten use the counterholder -T30004 (3415)-
- ☐ 90 Nm + 90°

19 - Toothed belt

- ☐ mark the direction of rotation with chalk or a felt-tip pen before removing
- ☐ check for wear
- ☐ removing ⇒ ["1.4 Removing and installing toothed belt", page 36](#)
- ☐ install (set the timing) ⇒ ["1.4.2 Installing \(set the timing\)", page 40](#)



Note

If the toothed belt is replaced when carrying out engine repair (apart from regular change interval), it should be entered in the Service Schedule!

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20 - Bottom toothed belt guard

- ☐ to remove, detach vibration damper

1.4 Removing and installing toothed belt

1.4.1 Removing

Special tools and workshop equipment required

- ◆ Supporting device - T30099-

- ◆ Surface - T30099/1-
- ◆ Two-hole nut turner - T10020-



Note

- ◆ *If the toothed belt is replaced when carrying out engine repair (apart from regular change interval), it should be entered in the Service Schedule!*

- ◆ *Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)*
⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8.

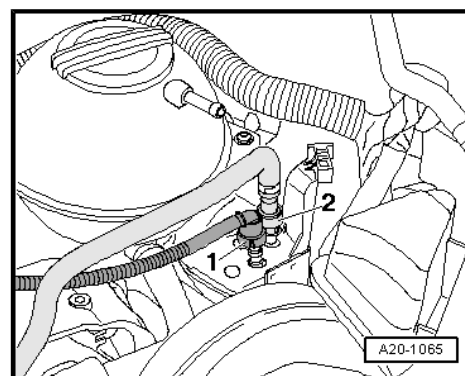
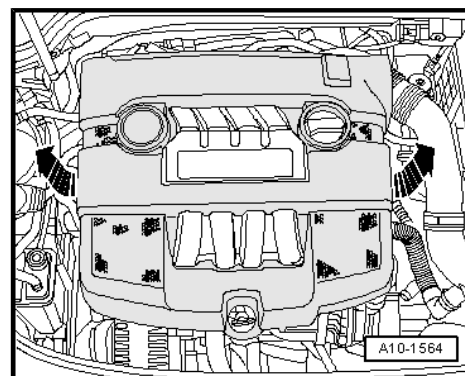
- If present, remove engine cover -arrows-.
- Disconnect the vacuum hose to the activated charcoal filter at the solenoid valve -N80-.



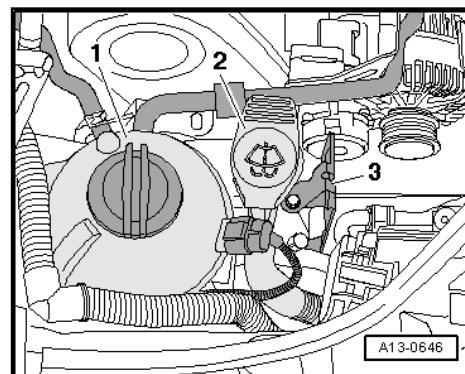
WARNING

The fuel system is under pressure! Before opening the system lay cleaning cloths around the connection point. Reduce pressure by carefully releasing the connection point.

- Disconnect the fuel feed line -2-, to do so pull the unlocking button.
- Disconnect the vacuum hose -1- to the activated charcoal filter, to do so press the unlocking button.
- Pull activated charcoal filter with its attached lines to the top out of the bracket.



- Unbolt bracket -3- for activated charcoal filter.
- Unscrew bolts on filler neck for windshield washer fluid reservoir -2-.
- Disconnect the line to the -F66- switch for the coolant shortage warning light at the expansion bottle -1-.
- Unscrew the coolant expansion bottle and lay with connected lines to one side.
- Remove V-ribbed belt
⇒ "1.2 Removing and installing V-ribbed belt", page 34.

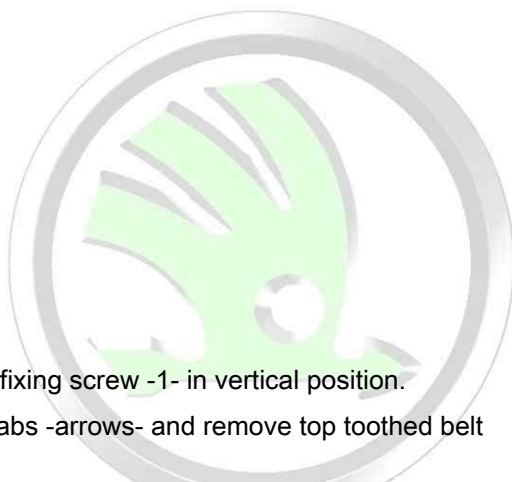


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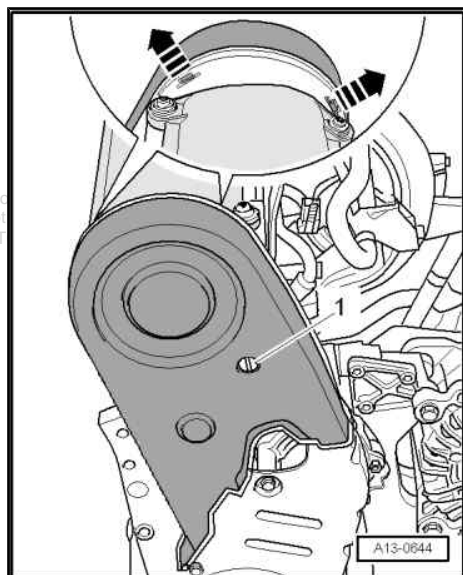
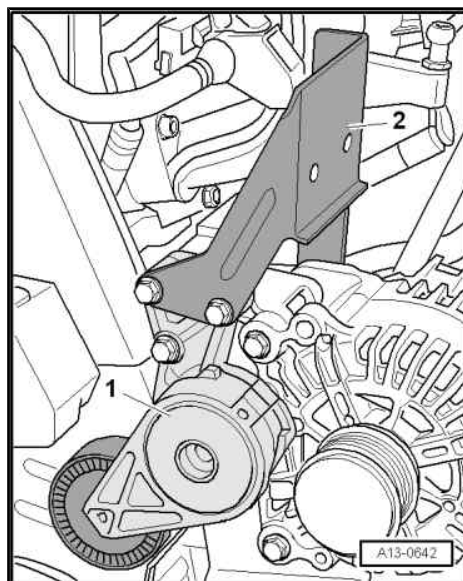
- Remove holder -2- and tensioning device -1- for V-ribbed belt.
- Remove top toothed belt guard.

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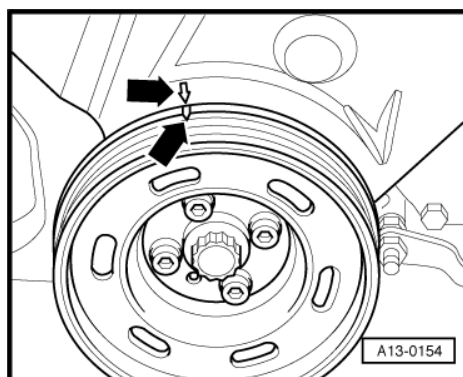


- To remove, turn fixing screw -1- in vertical position.
- Raise securing tabs -arrows- and remove top toothed belt guard.
- Remove the middle sound dampening system ⇒ Body Work; Rep. gr. 50 .

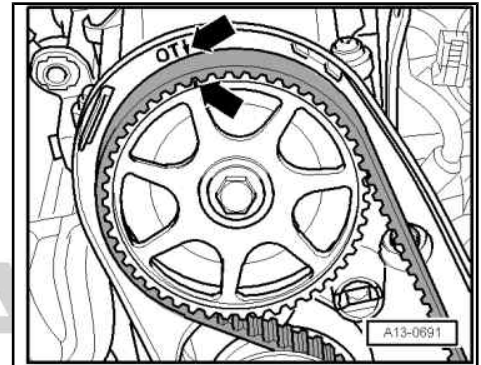
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- Rotate the crankshaft at the central bolt of the crankshaft toothed belt sprocket in direction of rotation of engine and position on TDC marking for cylinder 1 -arrows-.



- Simultaneously the front marking on the camshaft sprocket must be aligned with the marking on the rear toothed belt guard -arrows-. Where necessary, screw the crankshaft 1 further.

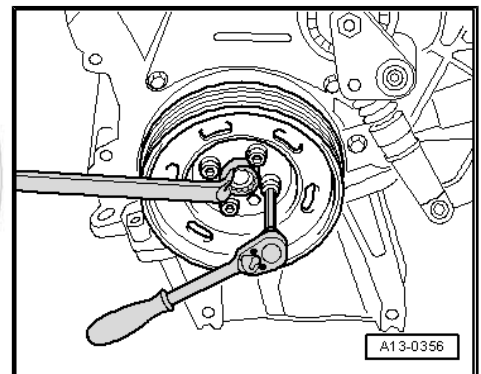


- Detach vibration damper.



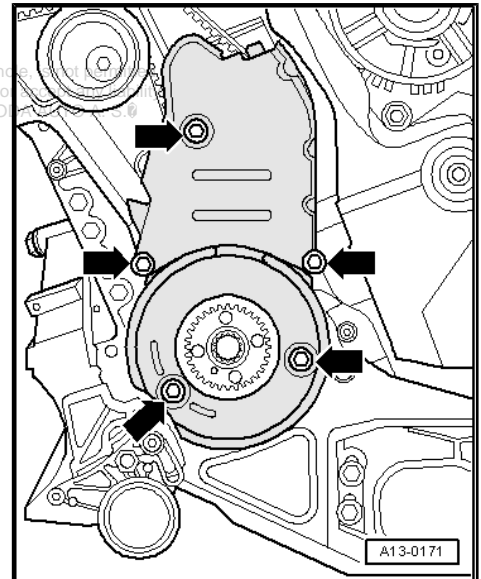
Note

To loosen and tighten the vibration damper, counterhold with ring spanner at the central bolt.

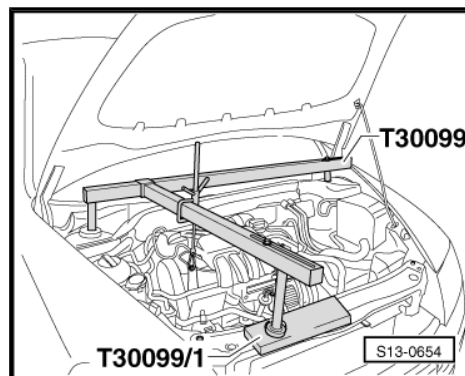


- Unscrew bottom and middle toothed belt guard -arrows-.

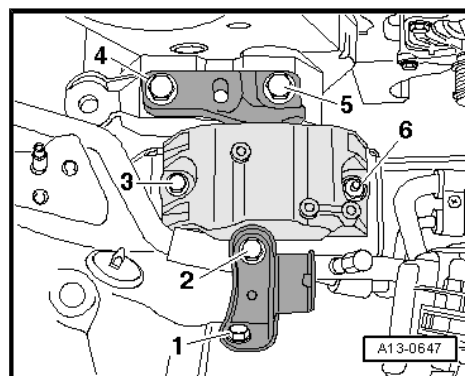
- Remove the cooling water tank cover ➤ Body Work; Rep. gr. 66 .



- Position supporting device -T30099- and base -T30099/1- .
- Hang the hook of the spindle on the lifting eye.
- Pre-tension the engine.



- Release screws -1- and -2- and remove connecting stud.
- Release screws -3...6- and remove engine mount console.



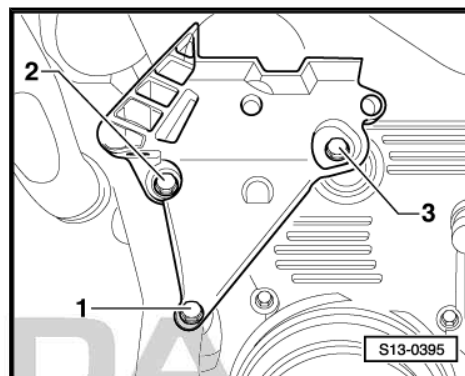
- Release screws -1...3- and remove engine support.



Note

To undo the screws on the engine support, raise or lower the spindle on the supporting device -T30099 - a little.

- Mark the direction of rotation of the toothed belt with chalk or a felt-tip pen.
- Loosen nut for tensioning pulley by a few turns.
- Remove timing belt.



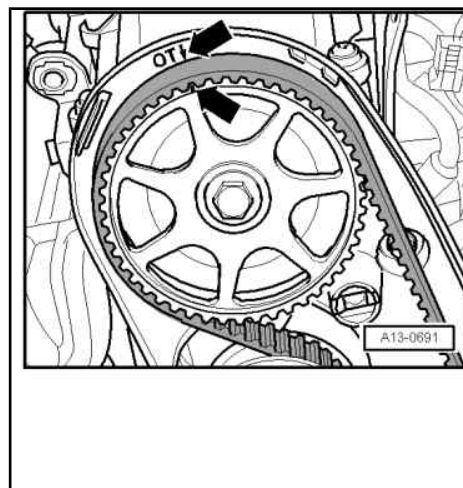
1.4.2 Installing (set the timing)



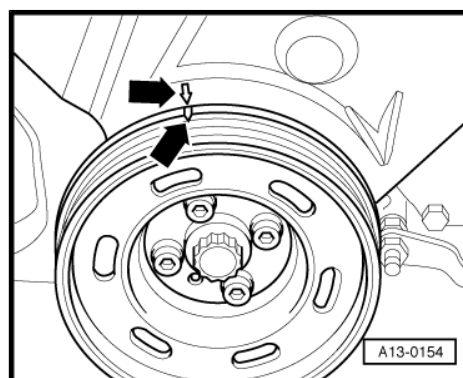
Note

- ◆ *When rotating the camshaft, the crankshaft must not be positioned at TDC. Risk of damaging valves and piston crowns.*
- ◆ *Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)*
⇒ *"2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8.*

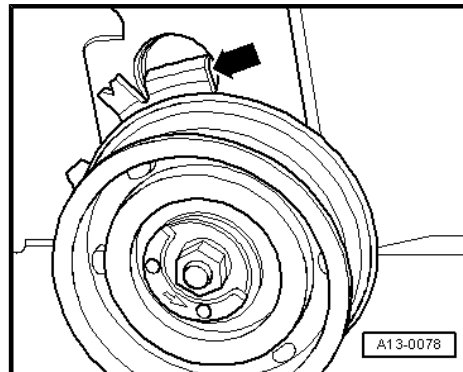
- Bring the marking on the camshaft sprocket in line with the marking on the timing belt guard -arrows-.
- Fit the toothed belt onto the crankshaft toothed belt sprocket, while doing so pay attention to direction of running.
- Install bottom timing belt guard.
- Secure belt pulley with a screw, while doing so pay attention to locating element.



- Once again check if the crankshaft is on TDC for cylinder 1 -arrows-.
- Fit timing belt in the order cooling pump, tensioning pulley, camshaft sprocket.



- Pay attention to installation position of semi-automatic tensioning pulley.
- The angle bracket -arrow- must engage in the recess at the cylinder head.



Tightening the timing belt



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- Rotate the tensioning pulley at the eccentric with the two-hole nut turner -T10020- in -direction of arrow- as far as the stop.
- Slacken tensioning pulley until the pointer -2- is approx. 10 mm below the notch -1-.
- Rotate the tensioning pulley at the eccentric again in -direction of arrow- as far as the stop.
- Slacken tensioning pulley again until the pointer -2- is approx. 10 mm below the notch -1-.
- Now slacken tensioning pulley until the notch -1- and the pointer -2- are positioned opposite.
- Tighten securing nut to 23 Nm.
- Turn crankshaft twice at central bolt of crankshaft toothed belt sprocket in direction of rotation of engine and check whether the camshaft and crankshaft markings coincide with their reference points on TDC.
- Check the tension on the timing belt once again. Repeat the setting if required.
- Install timing belt guard.

Further installation occurs in reverse order, while paying attention to the following:

- Tighten screws for engine support bracket.
- Install engine mount console.
- Install the vibration damper.
- Adjust engine mounting
⇒ [“2.2 Checking and adjusting the assembly bracket”, page 28](#) .
- Install the V-ribbed belt
⇒ [“1.2 Removing and installing V-ribbed belt”, page 34](#) .
- Venting air from the fuel system
⇒ [“1.9 Venting air from the fuel system”, page 139](#) .

1.5 Checking semi automatic toothed belt tensioning pulley

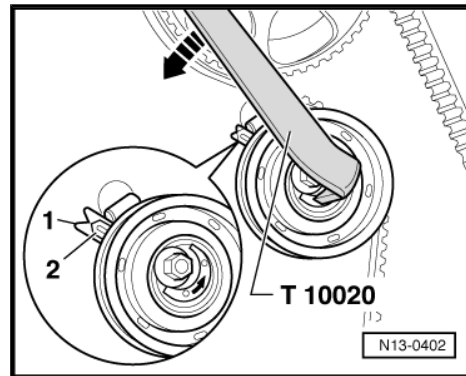


Note

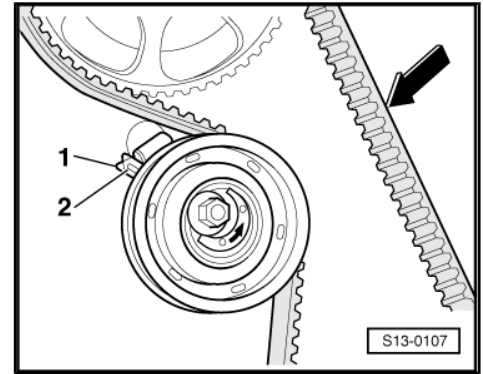
Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#) .

Test condition

- The engine temperature should not exceed 40°C.
- Position engine on TDC cylinder 1.



- Load timing belt by firmly pressing down with thumb -arrows-. The pointer -2- must move to the side.
- Relieve the pressure on the toothed belt and rotate crankshaft a further two revolutions in direction of rotation of engine until the engine is again positioned at TDC of cylinder 1. When doing this, it is important that the last 45° (1/8 turn) are rotated without any interruption.
- The tensioning roller must go back to its initial position. (The notch -1- and the pointer -2- are again standing opposite to each other.)



Note

For the inspection use a mirror.

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2 Removing and installing sealing flange and flywheel

⇒ [“2.1 Summary of components - sealing flange and flywheel”, page 44](#)

⇒ [“2.2 Replacing crankshaft sealing ring - belt pulley end”, page 45](#)

⇒ [“2.3 Removing and installing the sealing flange on the belt pulley side”, page 47](#)

⇒ [“2.4 Removing and installing sealing flange on gearbox side”, page 49](#)

⇒ [“2.5 Removing and installing drive plate”, page 50](#)

2.1 Summary of components - sealing flange and flywheel

1 - Screw

- ☐ 15 Nm

2 - Sealing ring

- ☐ replace after removal
⇒ [“2.2 Replacing crankshaft sealing ring - belt pulley end”, page 45](#)
- ☐ do not oil

3 - Sealing flange on the belt pulley side

- ☐ must be positioned on dowel sleeves
- ☐ removing and installing
⇒ [“2.3 Removing and installing the sealing flange on the belt pulley side”, page 47](#)

4 - Sealing screw

- ☐ insert using locking agent -D 000 600 A2-
- ☐ 10 Nm

5 - Cylinder block

6 - Sealing ring

- ☐ replace

7 - Screw plug

- ☐ 100 Nm

8 - Screw

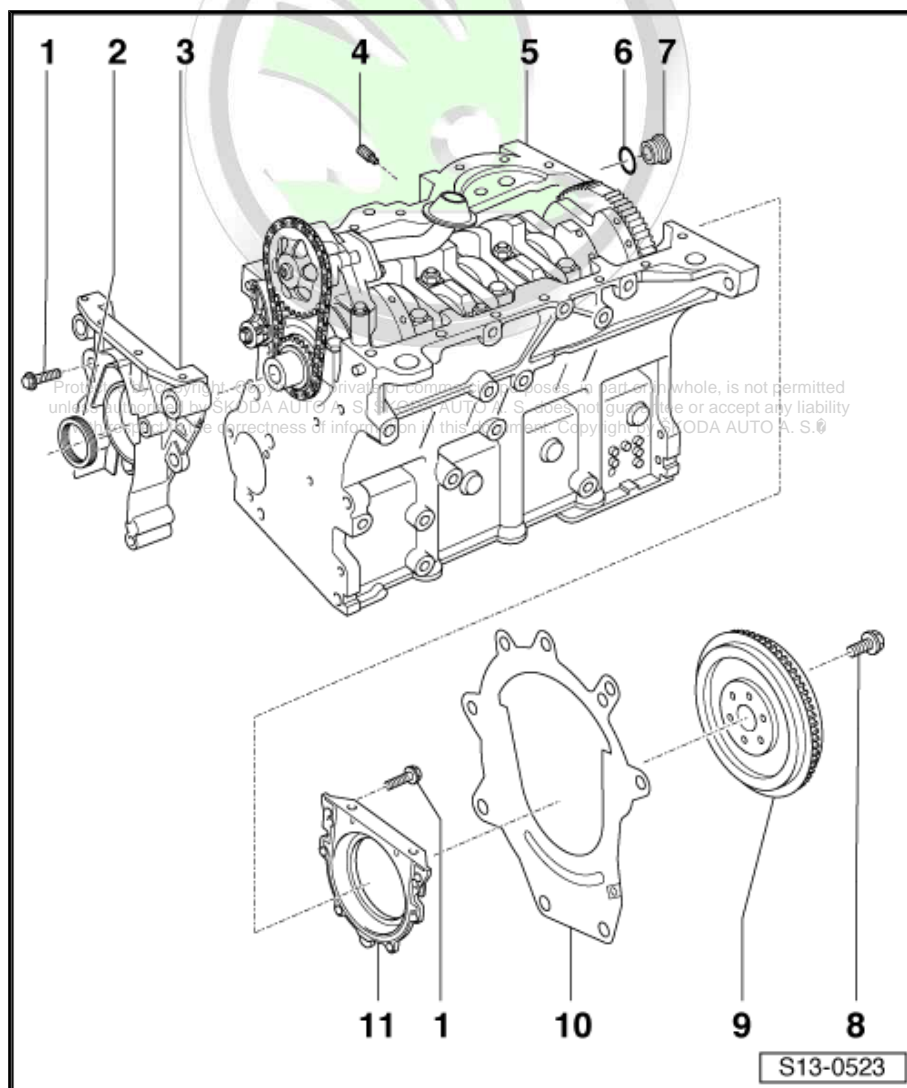
- ☐ Replace after disassembly
- ☐ 60 Nm + 90°

9 - Flywheel/drive plate

- ☐ for removing and installing the flywheel use flywheel lock -MP 1-504- or -MP 1-223- (fit onto starter ring gear, if the engine is fastened in the engine mount -MP1-202- at the assembly stand -MP9-101-)
- ☐ removing and installing driver disc ⇒ [“2.5 Removing and installing drive plate”, page 50](#)
- ☐ Installation is only possible in one position through offset holes

10 - Intermediate plate

- ☐ must be positioned on dowel sleeves



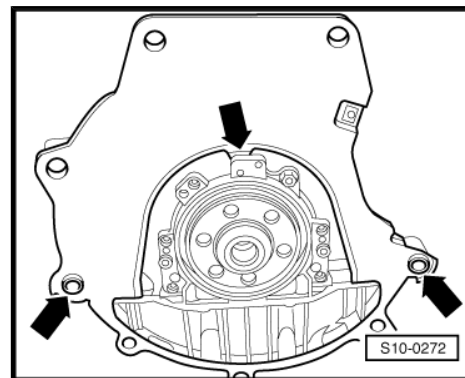
- ☐ do not damage/bend during assembly work
- ☐ inserted on sealing flange ⇒ [Fig. ““Installing intermediate plate””, page 45](#)

11 - Sealing flange on the gearbox side

- ☐ Only possible to replace complete with gasket ring
- ☐ removing and installing ⇒ [“2.4 Removing and installing sealing flange on gearbox side”, page 49](#)
- ☐ do not oil

Installing intermediate plate

- Insert intermediate plate on sealing flange and push onto the dowel sleeves -arrows-



2.2 Replacing crankshaft sealing ring - belt pulley end

Special tools and workshop equipment required

- ◆ Gasket ring extractor - MP 1-226-
- ◆ Counterholder - T30004 nebo MP 1-310-
- ◆ Assembly device - T10053-



Note

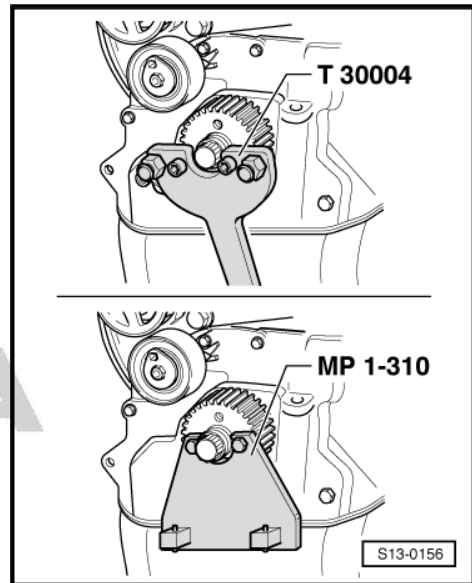
Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#).

Removing

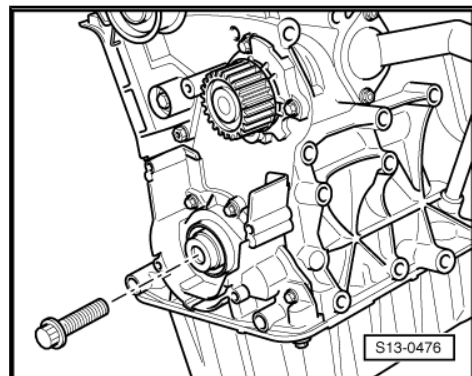
- Engine installed.
- Remove toothed belt
⇒ [“1.4 Removing and installing toothed belt”, page 36](#).



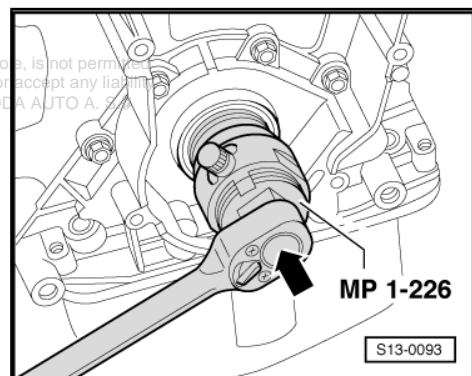
- Remove crankshaft toothed belt sprocket, to this end lock the toothed belt sprocket with counterholder -T30004 nebo MP 1-310- (the illustration shows another engine).



- Before inserting the gasket ring extractor, screw the central bolt of the toothed belt sprocket into the crankshaft up to the stop.



- Unscrew inner part of the gasket ring extractor -MP 1-226- nine turns out of the outer part and lock with knurled screw.
- Oil the thread head of the gasket ring extractor, position and forcibly screw into the gasket ring as far as possible.
- Release knurled screw and turn the inner side against the crankshaft until the gasket ring is pulled out.
- Clamp gasket ring extractor into the vice at the flats.
- Remove gasket ring with pliers.
- Clean the contact and sealing surface.



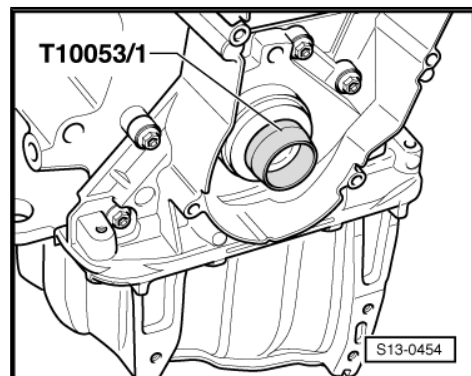
Install



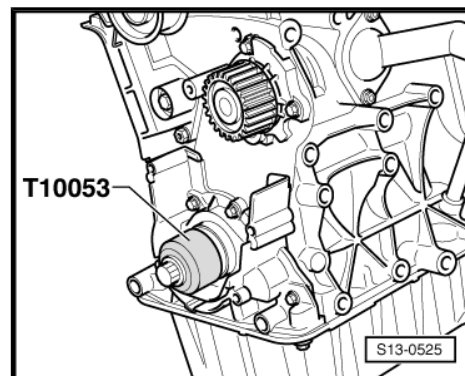
Note

Do not oil the sealing lip and the outer edge of the gasket before pressing it in.

- Fit -T10053/1- fitting sleeve onto the crankshaft journal.
- Slide gasket ring over the guide bushing.



- Press in the gasket ring with pressure bushing -T10053- and screw -T10053/2- up to the stop.
- Replace central bolt for toothed belt sprocket.

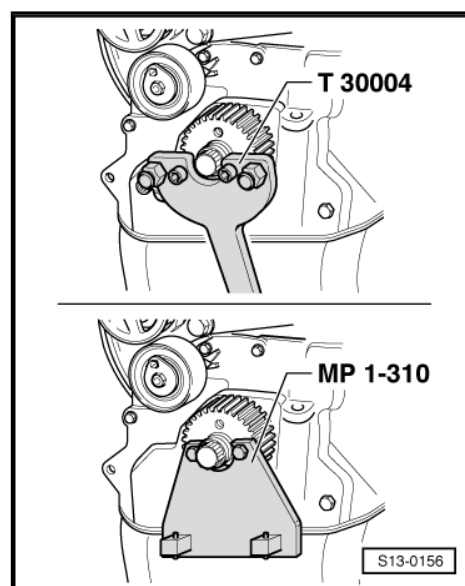


- Tighten crankshaft toothed belt sprocket, to this end counterhold the toothed belt sprocket with counterholder -T30004 nebo MP 1-310- (the illustration shows another engine). Tightening torque: 90 Nm + 90° .



Note

- ◆ *There must not be any oil present on contact surface between toothed belt sprocket and crankshaft.*
- ◆ *Do not oil screw for crankshaft toothed belt sprocket.*
- install (set the timing)
⇒ [“1.4 Removing and installing toothed belt”, page 36](#) .
- Install the V-ribbed belt
⇒ [“1.2 Removing and installing V-ribbed belt”, page 34](#) .



2.3 Removing and installing the sealing flange on the belt pulley side

Special tools and workshop equipment required

- ◆ Counterholder - T30004 (3415)- or counterholder for toothed belt sprocket - MP 1-310 (3099)-
- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ◆ Cleaning and degreasing agent , e.g. -D 009 401 04-
- ◆ Protective goggles and gloves
- ◆ Silicone sealant ⇒ Electronic catalogue of original parts (ET-KA)



Note

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Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#) .

Removing

- Engine installed.
- Remove toothed belt
⇒ [“1.4 Removing and installing toothed belt”, page 36](#) .



- Remove crankshaft toothed belt sprocket, to this end counterhold the toothed belt sprocket with counterholder - T30004 - or counterholder - MP 1-310 - (the illustration shows another engine).
- Drain engine oil.
- Removing the oil pan
⇒ [“1.3 Removing and installing oil pan”, page 90](#).
- Unscrew front sealing flange.
- Remove and lever off front sealing flange, if necessary release by applying slight blows with a rubber-headed hammer.



WARNING

Wear protective gloves and goggles when working with gasket remover and degreasing agent!

- Clean sealant residues with chemical sealant remover from the sealing surface on the flange and cylinder block.
- Degrease the sealing surfaces.
- Cover the gasket ring with a clean cloth.
- Where necessary, drive out the gasket ring from the removed flange.

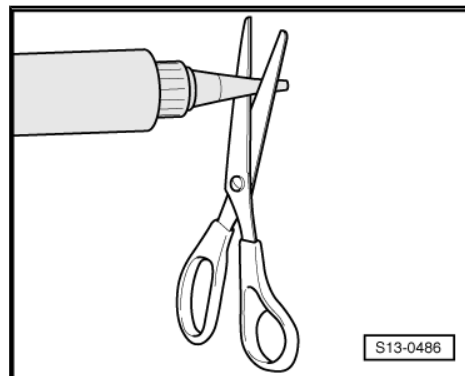
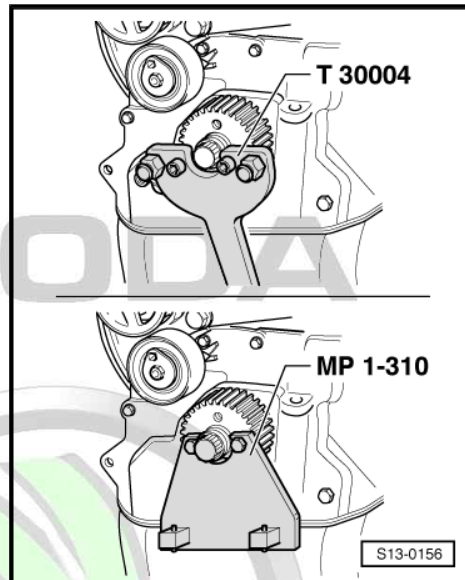
Install



Note

Pay attention to the use by date on sealant.

- Cut off nozzle tube at the front marking (Ø of nozzle approx. 3 mm).



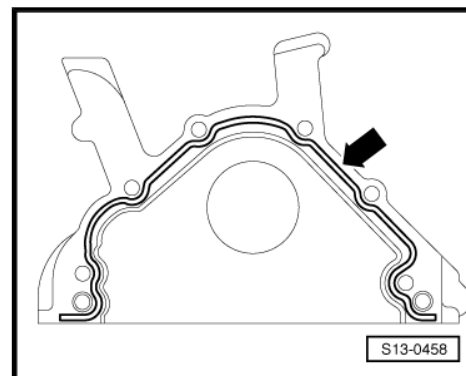
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- Apply silicone sealant bead -arrow- to the clean sealing surface of the upper part of the sealing flange, as shown.
- ◆ Thickness of sealant bead: 2 ... 3 mm.



Note

- ◆ *Before applying the sealant bead cover over the gasket ring with a clean cloth.*
- ◆ *The sealant bead must not be thicker than recommended otherwise excess sealant may get into the oil pan and clogg the strainer in the oil suction pipe.*
- ◆ *The sealing flange must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *When installing the sealing flange with the gasket ring fitted use fitting sleeve -T10053/1- .*
- ◆ *After installing, allow the sealant to dry for about 30 minutes. Only then may engine oil be filled in.*



- Fit sealing flange immediately and lightly tighten all bolts.
- Tighten the fixing screws of the sealing flange crosswise. Tightening torque: 15 Nm
- Remove excess sealant.
- Installing the oil pan
⇒ [“1.3 Removing and installing oil pan”, page 90](#) .
- Where necessary, install the new gasket ring for the crankshaft on the belt pulley side ⇒ [page 46](#) .
- Install toothed belt
⇒ [“1.4 Removing and installing toothed belt”, page 36](#) .

2.4 Removing and installing sealing flange on gearbox side

Special tools and workshop equipment required

- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ◆ Cleaning and degreasing agent , e.g. -D 009 401 04-
- ◆ Protective goggles and gloves



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#) .

Removing

- Gearbox removed.
- Remove flywheel -Position 9-
⇒ [“2.1 Summary of components - sealing flange and flywheel”, page 44](#) .



- Unhook intermediate plate at sealing flange and at dowel sleeves -arrows-.
- Drain engine oil.
- Removing the oil pan
⇒ ["1.3 Removing and installing oil pan", page 90](#) .
- Unscrew sealing flange.
- Lever off and remove sealing flange, if necessary release by applying slight blows with a rubber-headed hammer.



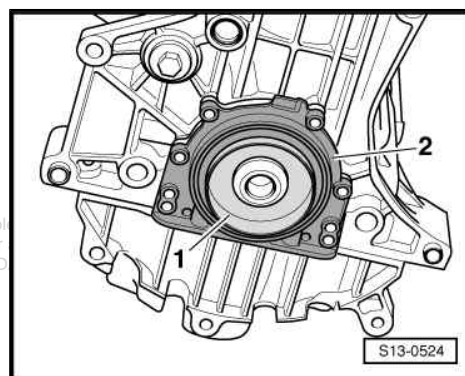
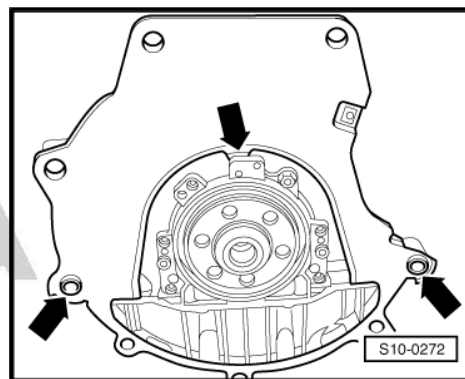
WARNING

Wear protective gloves and goggles when working with gasket remover and degreasing agent!

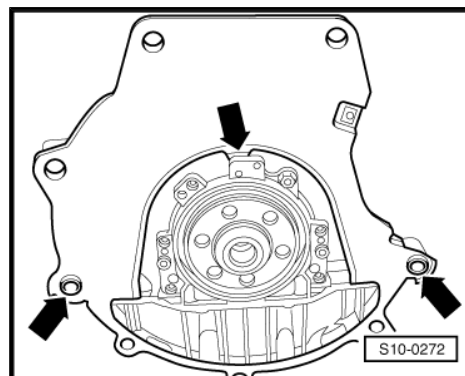
- Clean sealant residues with chemical sealant remover from the sealing surface on the flange and cylinder block.
- Degrease the sealing surfaces.

Install

- To install, push the sealing flange -2- together with guide bushing -1- (inserted in the spare part) onto the crankshaft.
- Then carefully push sealing flange onto the dowel pins at cylinder block.
- Tighten the fixing screws of the sealing flange crosswise. Tightening torque: 15 Nm
- Installing the oil pan
⇒ ["1.3 Removing and installing oil pan", page 90](#) .



- Insert intermediate plate on sealing flange and push onto the dowel sleeves -arrows-.
- Install flywheel -Position 9-
⇒ ["2.1 Summary of components - sealing flange and flywheel", page 44](#) .



2.5 Removing and installing drive plate

Special tools and workshop equipment required

- ◆ Counterholder for clutch - MP1-221 (VW 558)-
- ◆ Hexagon screw M8x45 and two nuts M10
- ◆ Depth gauge

i Note

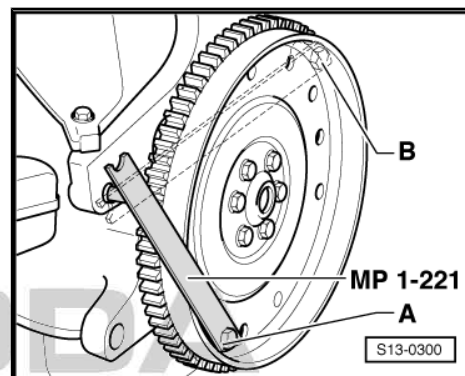
Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8.

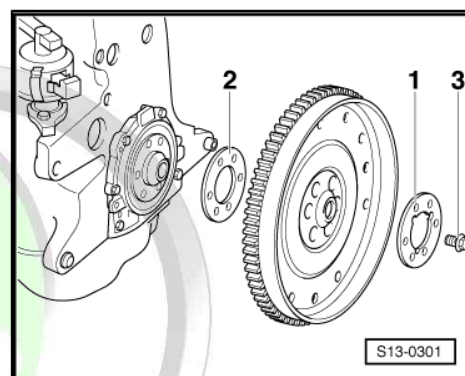
Releasing and tightening the drive plate

- Attach counterholder for clutch -MP1-221 (VW 558)- with M8x45 bolt to the drive plate. Place two M10 nuts between the counterholder and the driver disc. Fitting position of the counterholder: A - to loosen, B - to tighten.

Installing the drive plate



- Insert the drive plate using the washer with recesses -1-.
- Insert new bolts -3- and tighten to 30 Nm.

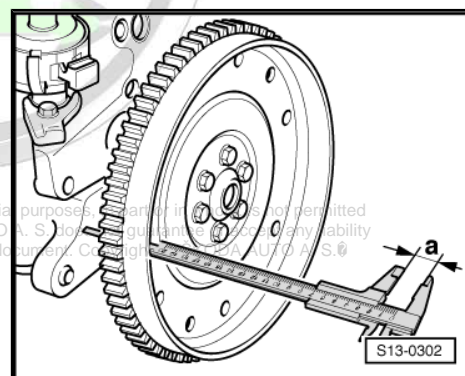


- Check dimension -a- in three points and determine the mean value. Specified value: 19.7..0.210.3 mm

i Note

The measurement is made through the hole of the drive plate to the milled surface of the cylinder block.

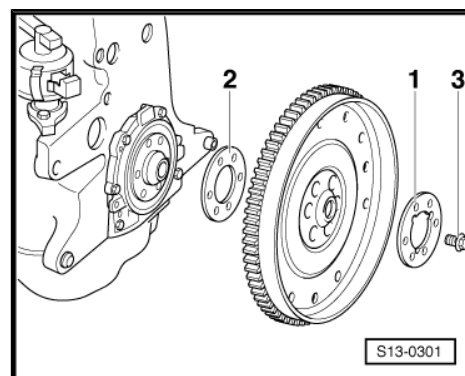
If the specified value is not reached:



- Remove driver disc and use compensating washer -2-. Tighten screws -3- again to 30 Nm and again check the dimension -a-.

If the specified value is reached:

- Tighten screws -3- to 60 Nm and a further 90° (the tightening may be done in several stages).



3 Removing and installing crankshaft

⇒ "3.1 Summary of components - crankshaft", page 52

⇒ "3.2 Replace needle bearing for crankshaft", page 54

⇒ "3.3 Removing and installing drive chain sprocket", page 55

3.1 Summary of components - crankshaft



Note

- ♦ Before removing the crankshaft, ensure a suitable space is available for to put it down so that the rotor -Pos. 9- ⇒ "3.1 Summary of components - crankshaft", page 52 does not rest on anything or get damaged.
- ♦ Pay attention to colour coding when inserting bearing shells ⇒ Fig. "Assign crankshaft bearing shells to the cylinder block", page 54
- ♦ When carrying out assembly work, the engine must be secured to the assembly stand - MP9-101- with the engine mount - MP1-202- or to the assembly stand - VAS 6095-.

1 - Thrust washers

- ☐ for bearing 3
- ☐ Fitting position: The oil grooves point to the crankshaft sprockets

2 - Bearing shell

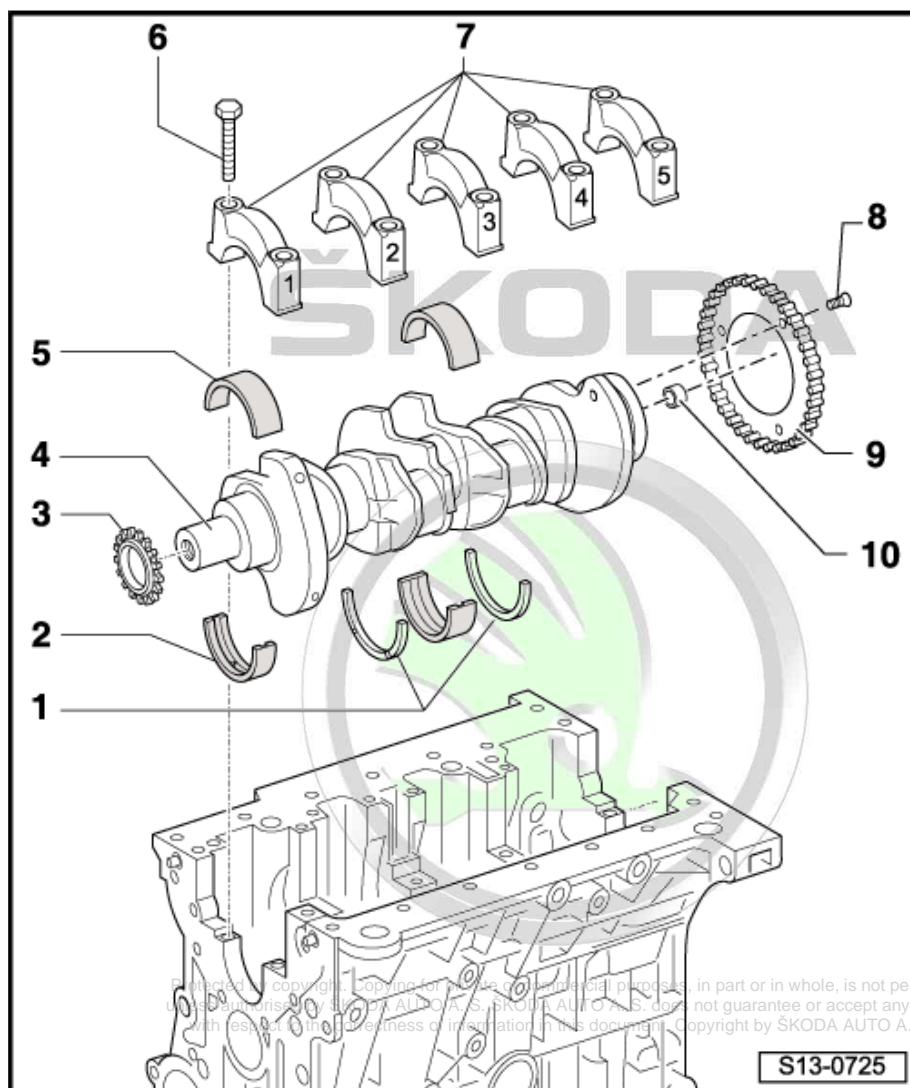
- ☐ for cylinder block with lubricating groove
- ☐ do not mix up already used bearing shells (mark)
- ☐ insert new bearing shells for cylinder block with correct identification
⇒ Fig. "Assign crankshaft bearing shells to the cylinder block", page 54
- ☐ pay attention to locating element

3 - Sprocket

- ☐ for oil pump drive
- ☐ removing and installing
⇒ "3.3 Removing and installing drive chain sprocket", page 55

4 - Crankshaft

- ☐ New axial clearance: 0.07...0.23 mm; wear limit: 0.30 mm
- ☐ Crankshaft bearing journals \varnothing 48.00 mm
- ☐ Rod bearing journals: \varnothing 42.00 mm



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5 - Bearing shell

- ☐ for bearing cap without lubricating groove
- ☐ do not mix up already used bearing shells (mark)
- ☐ The crankshaft bearing shells in the bearing caps are only supplied as replacement parts with the colour coding "yellow"
- ☐ pay attention to locating element

6 - Screw

- ☐ Replace after disassembly
- ☐ 40 Nm + 90°

7 - Bearing caps

- ☐ Bearing cover 1: Belt pulley side
- ☐ Fitting position: Retaining lugs of the bearing shells in the cylinder block and in the bearing caps must be on top of one another

8 - Screw

- ☐ replace sensor rotor each time the bolts are slackened
⇒ [Fig. "Removing and installing sensor rotor", page 53](#)
- ☐ 10 Nm + 90°

9 - Rotor

- ☐ for engine speed sender -G28-
- ☐ Installation is only possible in one position through offset holes
- ☐ replace the sensor rotor each time the bolts are slackened
- ☐ removing and installing ⇒ [Fig. "Removing and installing sensor rotor", page 53](#)

10 - Needle bearing

- ☐ only mounted on vehicles with automatic gearbox
- ☐ Pulling out and driving in the needle bearing for crankshaft
⇒ ["3.2 Replace needle bearing for crankshaft", page 54](#)

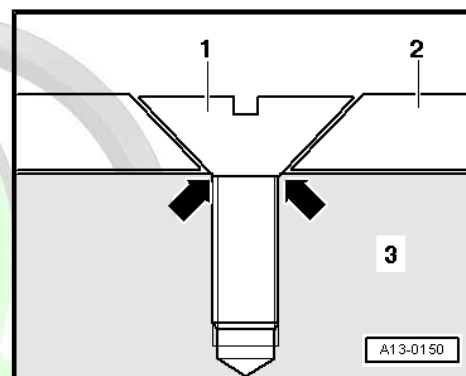
Removing and installing sensor rotor

- Always replace the sensor rotor -2- each time the bolts -1- are slackened.



Note

- ◆ *After being attached a second time, the attachment point of the recess head screws in the sensor rotor is sufficiently misshapen that the bolt heads rest against crankshaft -3- -arrows- and the sensor rotor is positioned loosely below the screws.*
- ◆ *It is only possible to install the sensor rotor in one position, the holes are offset.*





Assign crankshaft bearing shells to the cylinder block

The cylinder block bearing shells are allocated with the right thickness at the works. Coloured points on the bearing shell are used to mark the bearing shell thickness.

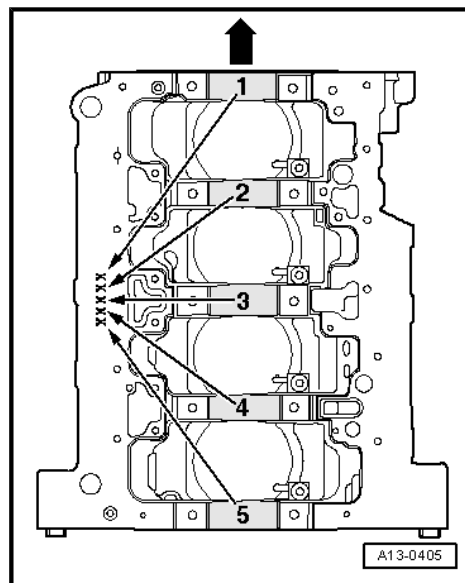


Note

- ◆ The arrow faces towards the belt pulley side.
- ◆ The markings are visible without removal of the oil pan.

The bearing shell is to be used at the location which is marked with letters, on the lower sealing surface of the cylinder block.

Letter on the cylinder block		Colour of the support
B	=	blue
G	=	yellow
W	=	white



Note

The crankshaft bearing shells in the bearing caps are only supplied as replacement parts with the colour coding "yellow".

3.2 Replace needle bearing for crankshaft

Only on vehicles equipped with automatic gearbox.

Special tools and workshop equipment required

- ◆ Centering mandrel - T30029 (3176)-
- ◆ Interior extractor - Kukko 21/2-
- ◆ Countersupport - Kukko 22/1-

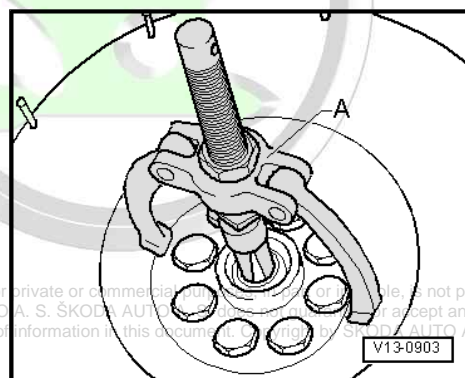
Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8 .

Removing

- Pull out needle bearing with interior extractor - Kukko 21/2- and countersupport - Kukko 22/1- .

Install



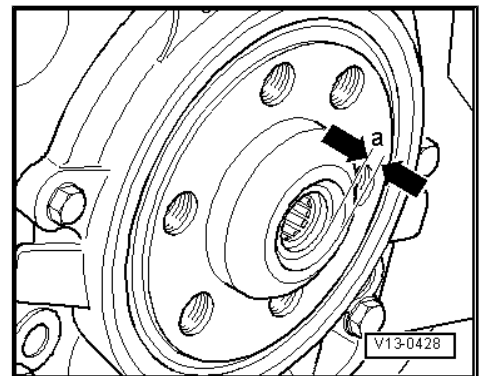
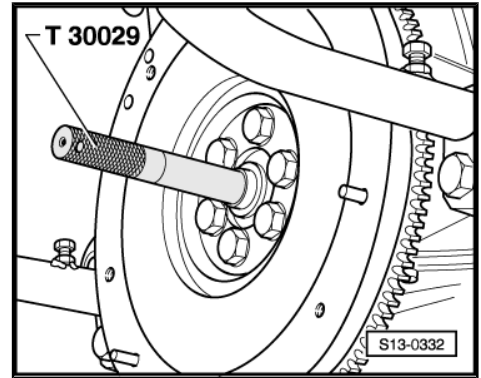
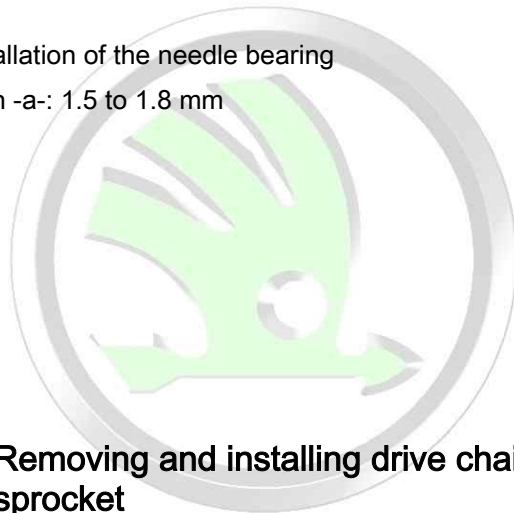
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- Drive in the needle bearing using the centring pin - T30029- .
- Fitting position: Labelled side of needle bearing must be legible in the installed condition.

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Depth of installation of the needle bearing

- Dimension -a-: 1.5 to 1.8 mm



3.3 Removing and installing drive chain sprocket

Special tools and workshop equipment required

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- ◆ Drive bushing - MP1-316 (30-100)-
- ◆ Two-arm extractor
- ◆ Protective gloves

Removing

- Removing the oil pan
⇒ [“1.3 Removing and installing oil pan”, page 90](#) .
- Remove the sealing flange on the belt pulley side
⇒ [“2.3 Removing and installing the sealing flange on the belt pulley side”, page 47](#) .
- Remove the drive chain sprocket for oil pump -Position 19-, -Position 23- and chain -Position 21-
⇒ [“1 Removing and installing parts of the lubrication system”, page 86](#) .



- Remove the drive chain sprocket with the two-arm extractor -2-, while protecting the shaft end of the crankshaft with a suitable washer -1-.

Install

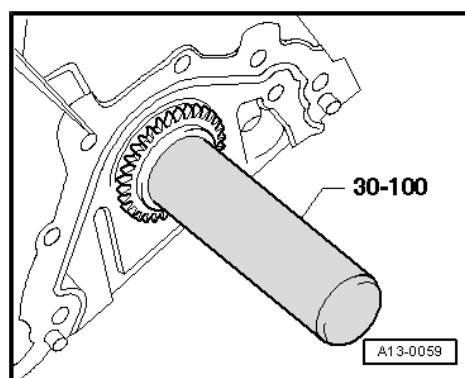
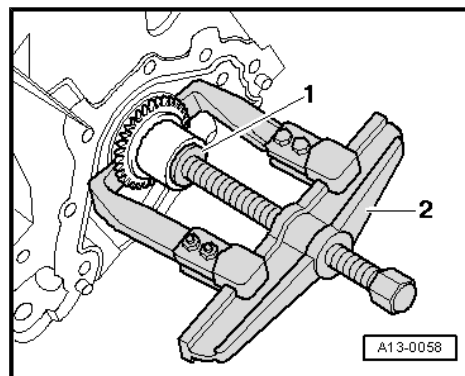
Installation is performed in the reverse order, pay attention to the following points:



WARNING

Wear protective gloves!

- Heat up the drive chain sprocket in an oven for about 15 minutes to 220 °C.
- Place the drive chain sprocket on the shaft end using pliers.
- Slide on the chain sprocket with drive bushing - MP1-316 (30-100)- until the stop on the crankshaft is reached.
- Fitting position: The broad collar of the drive chain sprocket points towards the engine.



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4 Disassembling and assembling pistons and conrods

⇒ [“4.1 Assembly overview - piston and conrod”, page 57](#)

⇒ [“4.2 Separating new conrod”, page 60](#)

4.1 Assembly overview - piston and conrod

1 - Screw

- ☐ Oil thread and contact surface
- ☐ 30 Nm + 90°

2 - Conrod bearing cap

- ☐ mark assignment to cylinder -B-
- ☐ Fitting position: markings -A- point toward belt pulley side

3 - Bearing shells

- ☐ top bearing shell with oil drilling for lubricating piston pin
- ☐ Fitting position
⇒ [Fig. “Fitting position of the bearing shells in the conrods”](#), page 60
- ☐ do not mix up already used bearing shells (mark)
- ☐ New axial clearance: 0.09...0.35 mm; wear limit: 0.4 mm

4 - Conrod

- ☐ replace as a set only
- ☐ mark assignment to cylinder -B-
- ☐ Fitting position: markings -A- point toward belt pulley side
- ☐ with oil drilling for lubricating piston pin
- ☐ with a split bearing cap
- ☐ separate new connecting rod ⇒ [“4.2 Separating new conrod”, page 60](#)

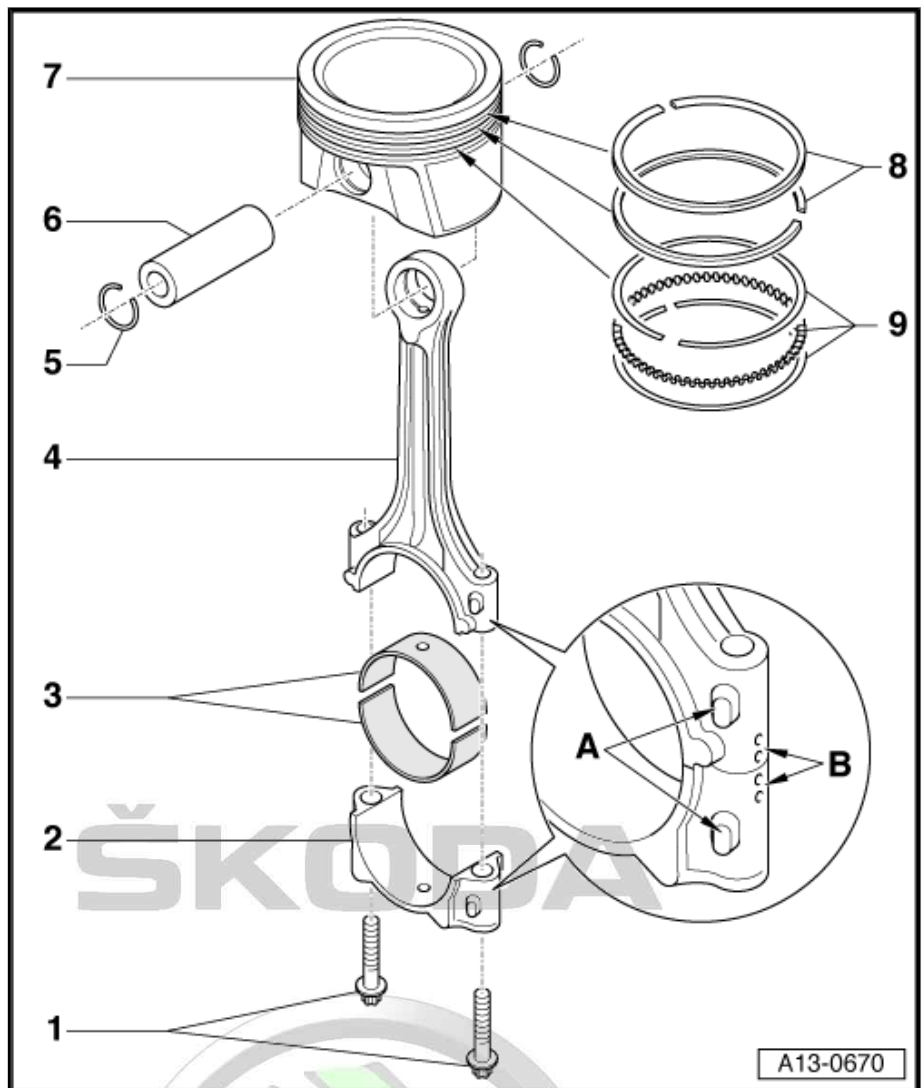
5 - Circlip

6 - Piston pin

- ☐ if stiff, heat piston to approx. 60°C
- ☐ with drift -VW 222 A- removing and installing

7 - Piston

- ☐ check ⇒ [Fig. “Inspecting pistons”](#), page 59
- ☐ mark installation position and matching cylinder
- ☐ arrow on the piston crown faces towards the belt pulley side
- ☐ use piston ring tensioning strap for installing





- ☐ inspect cylinder bore ➔ Fig. “Inspecting cylinder bore”, page 59
- ☐ Ø Piston 80.965 mm - Dimension without graphite coating
- ☐ Graphite coating: 0.02 mm
- ☐ Ø Cylinder 81.01 mm

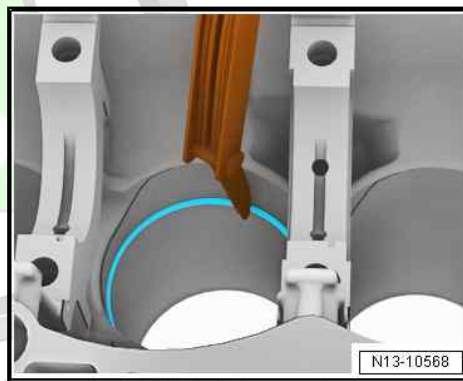
8 - Piston rings

- ☐ Compression rings
- ☐ Offset joint 120°
- ☐ use piston ring pliers for removing and installing
- ☐ marking “TOP” must face towards piston crown
- ☐ Checking ring gap ➔ Fig. “Inspecting piston ring gap clearance”, page 58
- ☐ Checking ring-to-groove clearance ➔ Fig. “Inspect piston ring end clearance”, page 59

9 - Piston ring

- ☐ Oil scraper ring
- ☐ 3 part
- ☐ Install joint of upper steel strip ring with 120° offset to the neighboring compression ring.
- ☐ Install joints of the parts of the oil scraper ring offset to each other

Inspecting piston ring gap clearance



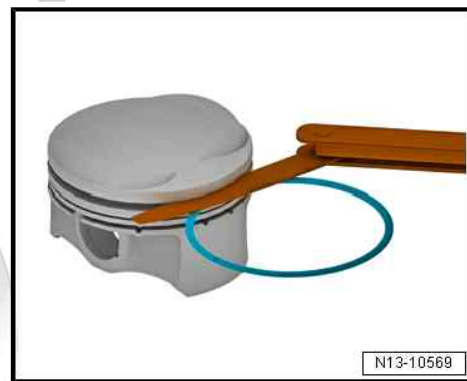
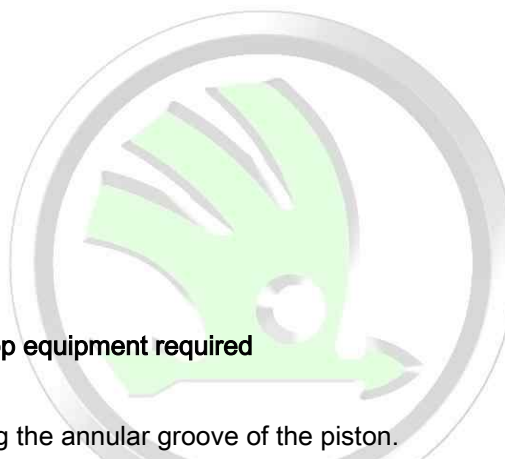
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Special tools and workshop equipment required

- ◆ Feeler gauges
- Push in ring at right angles to the cylinder wall from the top through to the bottom cylinder opening, about 15 mm from the cylinder edge. To insert use piston without rings.

Piston ring (dimensions in mm)	new	Wear limit
Compression ring - top	0,20 ... 0,40	0,80
Compression ring - bottom	0,75 ... 1,00	1,40
Steel strip rings of oil scraper ring	0,25 ... 0,50	0,80

Inspect piston ring end clearance

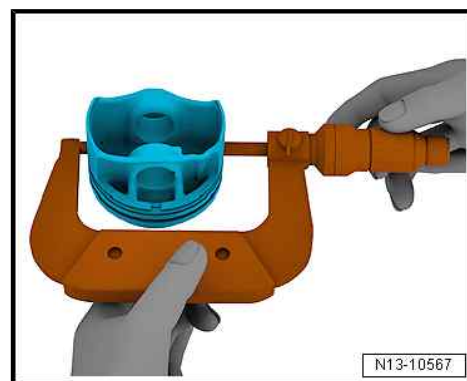


Special tools and workshop equipment required

- ◆ Feeler gauges
- Clean before inspecting the annular groove of the piston.

Piston ring (dimensions in mm)	new	Wear limit
Compression rings	0,06 ... 0,09	0,20
Oil scraper rings	0,03 ... 0,06	0,15

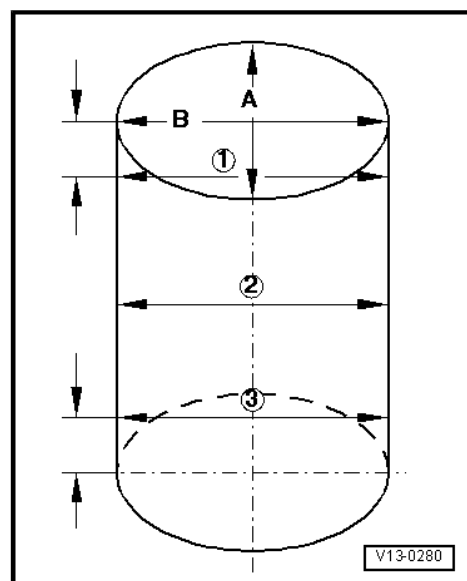
Inspecting pistons



Special tools and workshop equipment required

- ◆ External micrometer 75...100 mm
- Measure about 10 mm from the lower edge, offset at right angles to the piston pin shaft.
- ◆ Maximum deviation from nominal dimension: 0.04 mm.

Inspecting cylinder bore





Special tools and workshop equipment required

- ◆ Internal precision measuring instrument 50...100 mm
- Measure at 3 points crosswise in a transverse direction -A- and lengthwise -B- with the internal precision measuring instrument 50 ... 100 mm.
- ◆ Maximum deviation from nominal dimension: 0.08 mm.

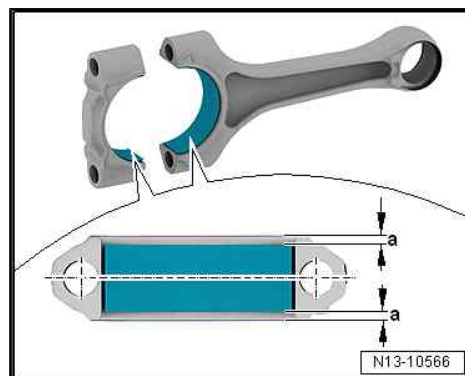


Note

Do not measure the cylinder bore if the cylinder block is fixed to the assembly stand with the engine mount -MP 1-202- , as this may result in incorrect measurements.

Fitting position of the bearing shells in the conrods

- Insert bearing shells centrally in the conrod or conrod bearing cap.
- ◆ Dimension -a- must be the same on both sides.



Note

The bearing shell with the oil drilling must be inserted into the conrod.

4.2 Separating new conrod

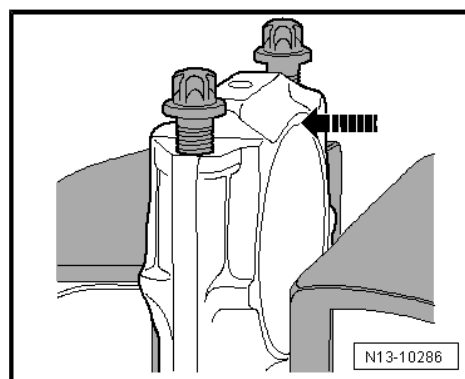
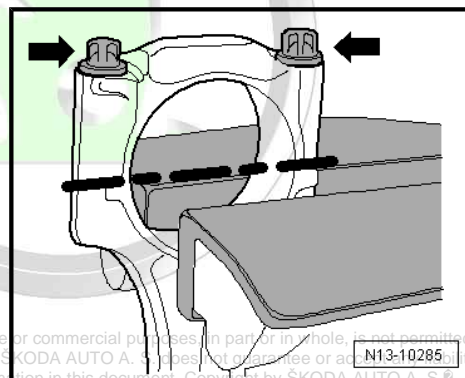
It can happen that on new connecting rods, the provided separation point is not completely cracked. If the conrod bearing cap cannot be removed by hand, then proceed as follows:

- Mark the assignment of the conrod to the cylinder.
- Slightly clamp the connecting rod, as shown in the illustration, in a vice provided with aluminium protective jaws.



Note

- ◆ *Only tension the conrod slightly in order to avoid damage on the conrod.*
- ◆ *The conrod is clamped below the broken line.*
- Unscrew both screws -arrows- by approx. 5 turns.
- Carefully knock against the conrod bearing cap with a plastic hammer in -direction of arrow- in order to loosen it.



15 – Cylinder head, valve gear

1 Cylinder head

⇒ [“1.1 Summary of components - cylinder head”, page 61](#)

⇒ [“1.2 Removing and installing the cylinder head”, page 63](#)

⇒ [“1.3 Testing the compression”, page 68](#)

⇒ [“1.4 Testing the combustion chamber for tightness”, page 69](#)

1.1 Summary of components - cylinder head



Note

- ◆ *Engine temperature should not exceed 35 °C, because the cylinder head could be twisted when slackening the screws.*
- ◆ *Replace cylinder head bolts.*
- ◆ *Replace the self-locking nuts and screws when undertaking assembly work.*
- ◆ *Replace screws which have been tightened to a torquing angle as well as gasket rings and seals.*
- ◆ *When installing a cylinder head, all the contact surfaces between the hydraulic tappets, roller rocker arms and the cam tracks must be oiled before installing the cylinder head cover.*
- ◆ *The plastic base for protecting the open valves should only be removed immediately before attaching the cylinder head.*
- ◆ *If the cylinder head is replaced, the system must be completely filled with fresh coolant.*
- ◆ *Cylinder heads with cracks between the valve seats or between a valve seat ring and the spark plug thread may continue to be used without any reduction in life provided these are slight initial cracks which are not more than 0.3 mm wide, or cracks exist only at the first 4 turns of the spark plug thread.*
- ◆ *Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)*
⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#).

- ❑ insert using locking agent -D 000 600 A2-
- ❑ 23 Nm

3 - Screw

- ☐ to release and tighten use the counterholder - T30004 (3415)-
- ☐ 100 Nm

- ☐ insert using locking agent -D 000 600 A2-
- ☐ 10 Nm

6 - Woodruff key

- ☐ Replace after disassembly

 10 Nm

- to coolant expansion reservoir

- ☐ replace if damaged or leaking
- ☐ 9 Nm

- ❑ replace if damaged or leaking

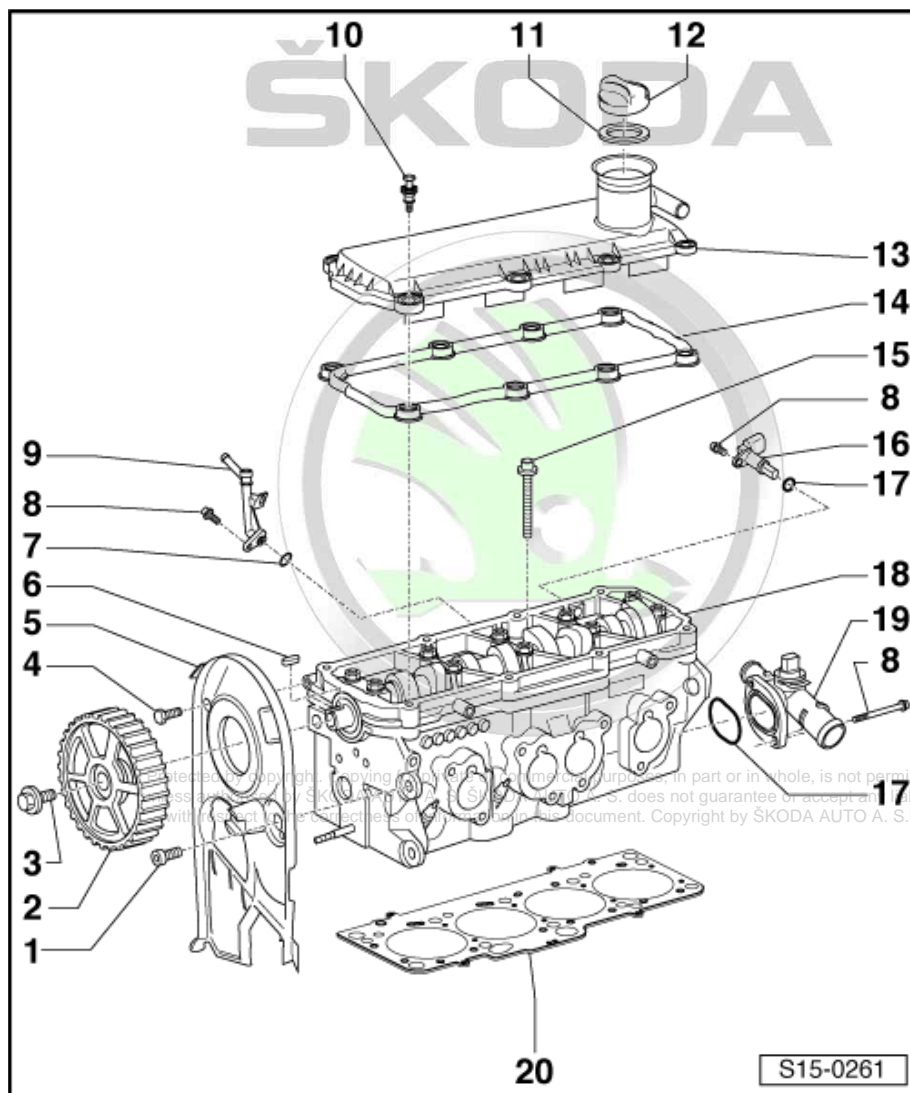
13 - Cylinder head cover

- ☐ replace if damaged or leaking
- ☐ fit into the spacer sleeves Pos. -10- → **Item 10 (page 62)** .

- ❑ Replace after disassembly
- ❑ pay attention to order for slackening ⇒ [page 65](#)
- ❑ pay attention to order for tightening ⇒ [page 68](#)

- ☐ Replace after disassembly

- ❑ removing and installing ⇒ “1.2 Removing and installing the cylinder head”, page 63
- ❑ check for distortion ⇒ Fig. “Inspecting the cylinder head for distortion” , page 63
- ❑ Reworking dimension ⇒ Fig. “Reworking dimension of cylinder head” , page 63
- ❑ fill with fresh coolant after replacing



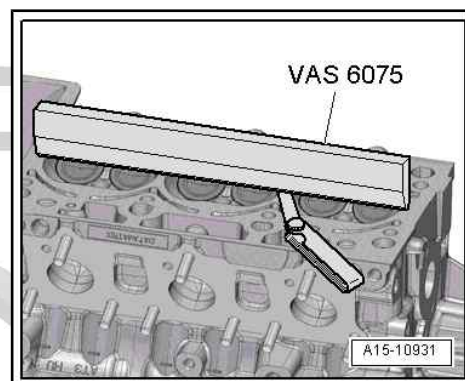
19 - Connection fittings

20 - Cylinder head gasket

- ☐ Replace after disassembly
- ☐ Fitting position: The part number faces the cylinder head and must be legible from the inlet side

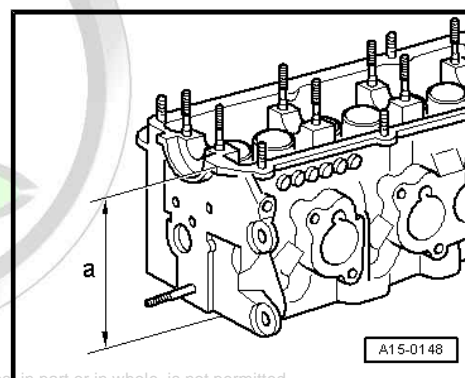
Inspecting the cylinder head for distortion

- Inspect cylinder head at several points for distortion using a 500 mm knife-edge straightedge - VAS 6075- and feeler gauge.
- ♦ Max. permissible distortion: 0.1 mm.



Reworking dimension of cylinder head

- Reworking of the cylinder head (face-grinding) is only permissible up to minimum dimension -a-.
- ♦ Minimum dimension: a = 132.8 mm.



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1.2 Removing and installing the cylinder head

Special tools and workshop equipment required

- ♦ Counterholder - T30004 (3415)-
- ♦ Guide bolt - T30011/2A (3450/2A)-
- ♦ Extractor - T30011/3 (3450/3)-
- ♦ Catch pan , e.g. -VAS 6208-
- ♦ Pliers for spring strap clamps
- ♦ Extractor - T10112- or -T10112A-
- ♦ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ♦ Protective goggles and gloves

1.2.1 Removing

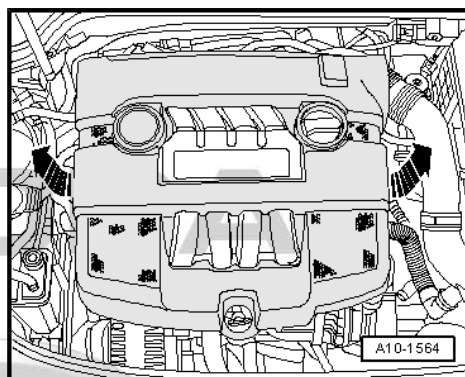
- Engine temperature should not exceed 35 °C, because the cylinder head could be twisted when slackening the screws.



Note

- ♦ All cable straps which are detached or cut open when removing, should be fitted on again in the same place when installing.
- ♦ Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8.

- Disconnect the battery-earth strap with the ignition off.
- If present, remove engine cover -arrows-.
- Drain coolant
⇒ "1.7 Draining and filling up coolant", page 105.
- Remove pre-exhaust pipe
⇒ "1.3 Removing and installing pre-exhaust pipe with catalytic converter", page 204.
- Remove air filter
⇒ "1.4 Air filter with component parts - Summary of components", page 177.
- Removing the intake manifold
⇒ "1.2 Assembly overview - intake manifold", page 175.
- Use extractor - T10112- to unplug spark plug connector.
- Pull off coolant hose at rear vent connection at cylinder head.
- Disconnect the plug connection at the camshaft position sensor -G163-.

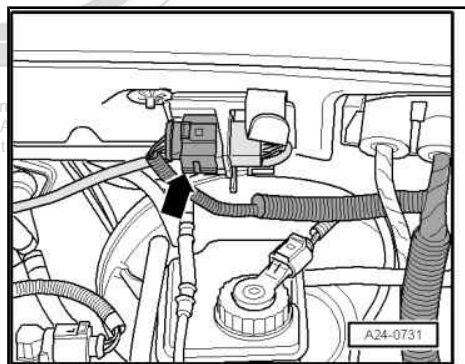


For engine with engine code BGU

- Disconnect plug connection at exhaust gas recirculation valve -N18-.

For all vehicles

- Expose cable harness.
- Remove the plug connection -arrow- for the lambda probe - G39- (upstream of catalytic converter) from the bracket and disconnect.
- Unscrew left connection fittings from cylinder head and lay it to the side

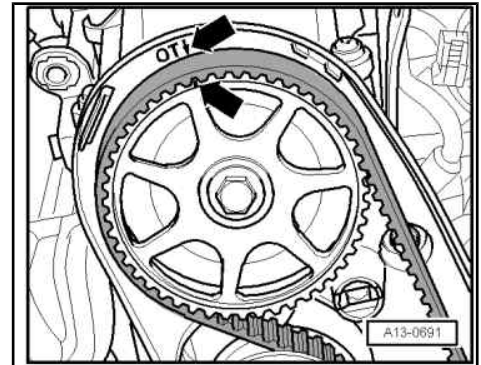


Note

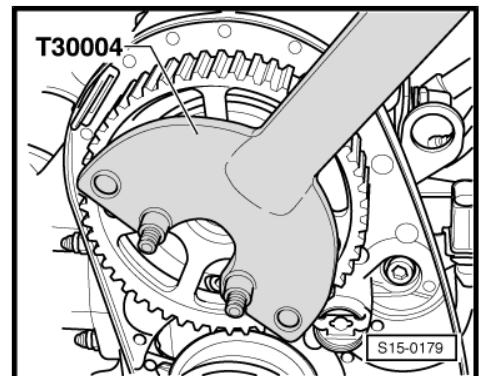
The coolant hoses remain attached to the connection fittings.

- Remove top toothed belt guard.

- Position camshaft sprocket to TDC marking for cylinder 1 by rotating at crankshaft. The marking on the camshaft sprocket must be aligned with the arrow on the toothed belt guard.
- Slacken tensioning pulley and take timing belt off camshaft sprocket.
- Then turn crankshaft back slightly.



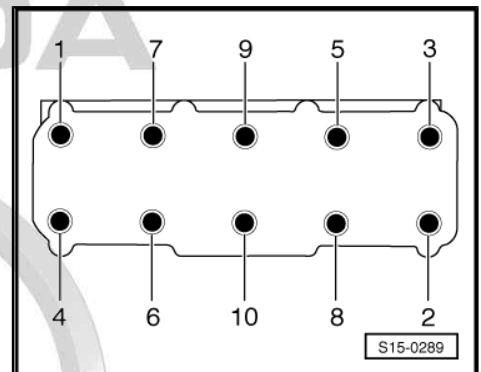
- Loosen the camshaft sprocket, to do so use counterholder - T30004 (3415)- .
- Pull off camshaft sprocket.
- Remove Woodruff key from the camshaft.
- Unscrew rear toothed belt guard from cylinder head.
- Detach the hose for the crankcase ventilation from the cylinder head cover.
- Slacken the bolts for the cylinder head cover from the outside to the inside.
- Remove cylinder head cover.
- Release the cylinder head bolts in the order -1...10- .



Note

A second mechanic is needed to remove the cylinder head.

- Swivel the cylinder head to the left out of the rear toothed belt guard and simultaneously remove the tensioning pulley.





1.2.2 Install



Note

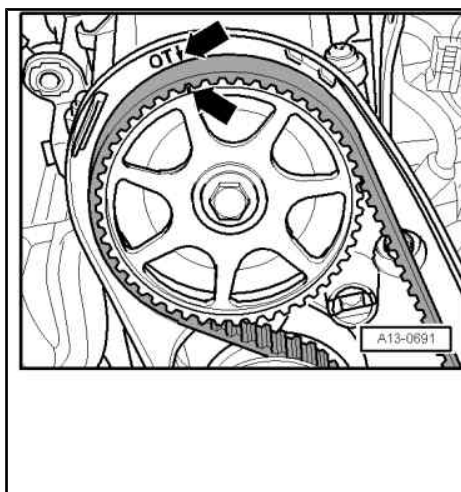
- ◆ *Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)*
⇒ *"2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8.*
- ◆ *Replace cylinder head bolts.*
- ◆ *Replace the self-locking nuts and screws when undertaking assembly work.*
- ◆ *Replace screws which have been tightened to a torquing angle as well as gasket rings and seals.*
- ◆ *When installing an exchange cylinder head with the camshaft installed, it is necessary to oil the contact surfaces between the roller rocker arms and the cam track after installing the head.*
- ◆ *Remove the new cylinder head gasket from its wrapping immediately before fitting.*
- ◆ *Treat the new seal with the utmost care. Damage to the silicone layer and in the area of the bead results in leakages.*
- ◆ *There must be no oil or coolant in the blind holes for the cylinder head bolts in the cylinder block.*
- Make sure that, when cleaning the cylinder head and cylinder block, no foreign bodies can get into the cylinder or into the oil and coolant galleries.



WARNING

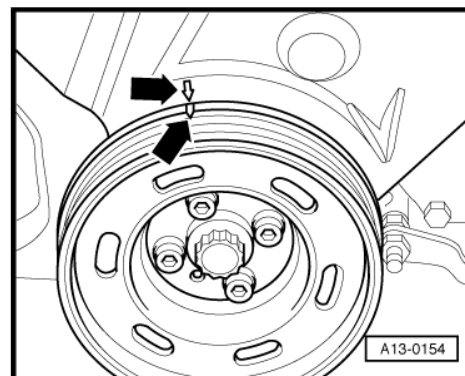
Wear protective goggles and gloves when working with sealant and grease remover!

- When conducting repairs sealant residues should be removed from the contact surface of the cylinder head/cylinder block using a chemical cleaner.
- Bring the marking on the camshaft sprocket in line with the marking on the timing belt guard -arrows-.



- Once again check if the crankshaft is on TDC for cylinder 1 -arrows-.

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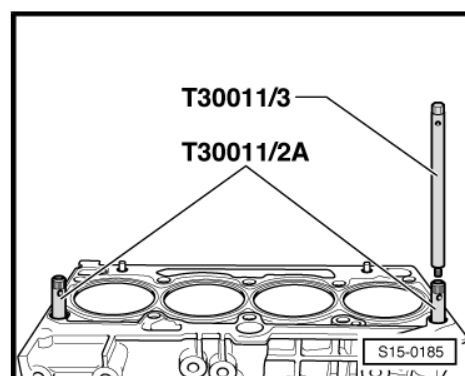
- To centre the cylinder head gasket and cylinder head, screw in the guide pins -T30011/2A (3450/2A)- into the outer holes on the suction side.



Note

The tolerance of the centering holes has been constricted in the top area. For this reason, check first of all, before fitting on the cylinder head, whether the guide pins can be removed upward. If necessary, slightly grind off the knurling of the guide pins.

- Position the new cylinder heads. The legend (part number) must be legible.



Note

A second mechanic is needed to fit on the cylinder head.

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- Swivel cylinder head into rear toothed belt guard and simultaneously push the tensioning pulley onto the threaded pin.
- Fit cylinder head onto cylinder block.
- Insert 8 new cylinder head bolts and tighten by hand.
- Screw out the guide bolts through the bolt holes using the removal tool -T30011/3 (3450/3)- and screw in the remaining cylinder head bolts.



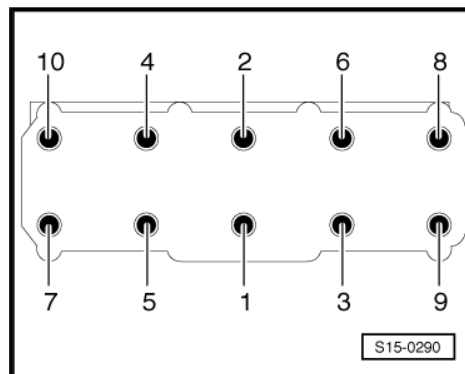
- Tighten the cylinder head in 3 stages in the order shown:

Stage	Tighten
1	– Pre-tighten with the torque wrench to 40 Nm.
2	– Tighten further 90° with a rigid wrench.
3	– Tighten further 90° with a rigid wrench.



Note

Tightening up the cylinder head bolts after doing repair work is not necessary.



- install (set the timing)
⇒ [“1.4 Removing and installing toothed belt”, page 36](#) .
- Install the V-ribbed belt
⇒ [“1.2 Removing and installing V-ribbed belt”, page 34](#) .
- Installing the intake manifold
⇒ [“1.2 Assembly overview - intake manifold”, page 175](#) .
- Checking the oil level ⇒ Maintenance ; Booklet Octavia II .



Note

In case of contaminated engine oil, carry out oil change ⇒ Maintenance ; Booklet Octavia II

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- Install pre-exhaust pipe
⇒ [“1.3 Removing and installing pre-exhaust pipe with catalytic converter”, page 204](#) .
- Align exhaust system free of stress
⇒ [“1.6 Aligning exhaust system free of stress”, page 209](#) .
- Connect up the battery. Important instructions ⇒ Electrical System; Rep. gr. 27 .
- Top up coolant
⇒ [“1.7 Draining and filling up coolant”, page 105](#) .

1.3 Testing the compression

Special tools and workshop equipment required

- ♦ Spark plug wrench , e.g. -3122 B-
- ♦ Compression tester , e. g -V.A.G 1381- or -V.A.G 1763-
- ♦ Extractor - T10112-



Note

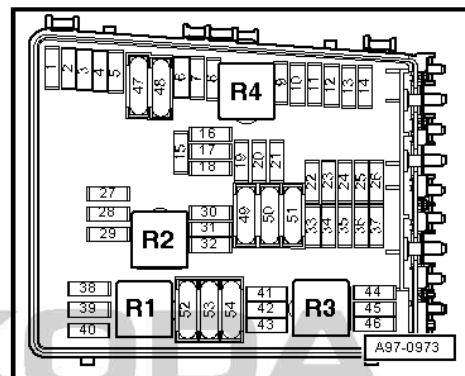
Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#) .

Test conditions

- Oil temperature min. 30 °C.
- Battery voltage at least 12.7 V.
- Switch off ignition.

- Open lid of E-box in the engine compartment and unplug fuses F6 und F32 for ignition transformer and injection valves.

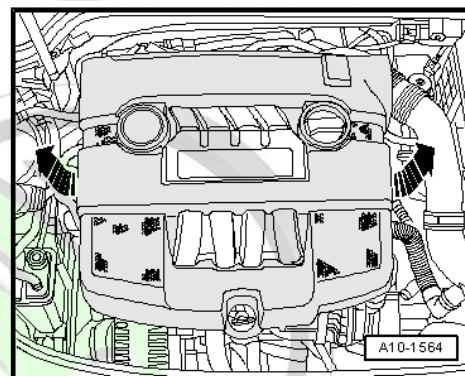


- If present, remove engine cover -arrows-.
- Separate the electrical plug connections in the outer injection valves.
- Use extractor -T10112- to unplug spark plug connector.
- Unscrew the spark plugs with spark plug wrench.
- Check compression pressure using the compression tester.



Note

Use of tester ⇒ Operating Instructions .



- Have a second mechanic operate the starter with the throttle valve fully opened until no further pressure rise is indicated by the tester.

Compression readings

Engine new	Wear limit	Difference between cylinders
1.0...1.3 MPa (10...13 bar)	0.7 MPa (7 bar)	max. 0.3 MPa (3 bar)

If the specified values are not reached, test the combustion chamber for tightness

⇒ ["1.4 Testing the combustion chamber for tightness", page 69](#) .

Installation is performed in the reverse order, pay attention to the following points:

After the compression pressure test, the following work steps must be carried out.

- Querying and erasing event memory of engine control unit
⇒ Vehicle diagnostic tester.

1.4 Testing the combustion chamber for tightness

Special tools and workshop equipment required

- ◆ Pressure hose - MP1-210 (VW 653/3)- (replace gasket ring with a spark plug gasket ring)
- ◆ Spark plug wrench



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8 .

- Unscrew the spark plugs.
- Position piston of the relevant cylinder to dead centre.
- Screw the pressure hose MP 1-210 into the spark plug thread.
- Connect pressure hose to compressed air.
- With the assistance of a second mechanic, lock the screw at the crankshaft on TDC position in order to avoid the displacement of the piston after pressure build-up.
- Build up a pressure of approx. 0.3 MPa (3 bar) in the combustion chamber.
- Determine how the pressure escapes:
 - 1 - Via the inlet valve(s) - the pressure enters the throttle valve.
 - 2 - Via the outlet valve(s) - the pressure enters the exhaust system.
 - 3 - Via the piston rings - the pressure enters the cylinder block.

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2 Valve gear

⇒ [“2.1 Summary of components - camshaft”, page 71](#)

⇒ [“2.2 Replacing camshaft gasket ring”, page 74](#)

⇒ [“2.3 Removing and installing camshaft”, page 76](#)

⇒ [“2.4 Checking hydraulic balancing elements”, page 78](#)

⇒ [“2.5 Inspect valve guides”, page 79](#)

⇒ [“2.6 Replacing valve stem seals”, page 80](#)

⇒ [“2.7 Reworking valve seats”, page 82](#)

2.1 Summary of components - camshaft



Note

- ◆ *Cylinder heads with cracks between the valve seats or between a valve seat ring and the spark plug thread may continue to be used without any reduction in life provided these are slight initial cracks which are not more than 0.3 mm wide, or cracks exist only at the first 4 turns of the spark plug thread.*
- ◆ *After installing the camshaft, the engine must not be started for about 30 minutes. The hydraulic clearance compensation elements must settle (otherwise valves would strike the pistons).*
- ◆ *After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.*
- ◆ *Always replace seals and gasket rings.*

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1 - Screw

- ☐ to release and tighten use the counterholder - T30004 (3415)-
- ☐ 100 Nm

2 - Camshaft sprocket

- ☐ for removal and installation, remove toothed belt
⇒ ["1.4 Removing and installing toothed belt", page 36](#)
- ☐ Installation position fixed by woodruff key -4-
⇒ [Item 4 \(page 72\)](#)

3 - Sealing ring

- ☐ replace after removal
⇒ ["2.2 Replacing camshaft gasket ring", page 74](#)

4 - Woodruff key

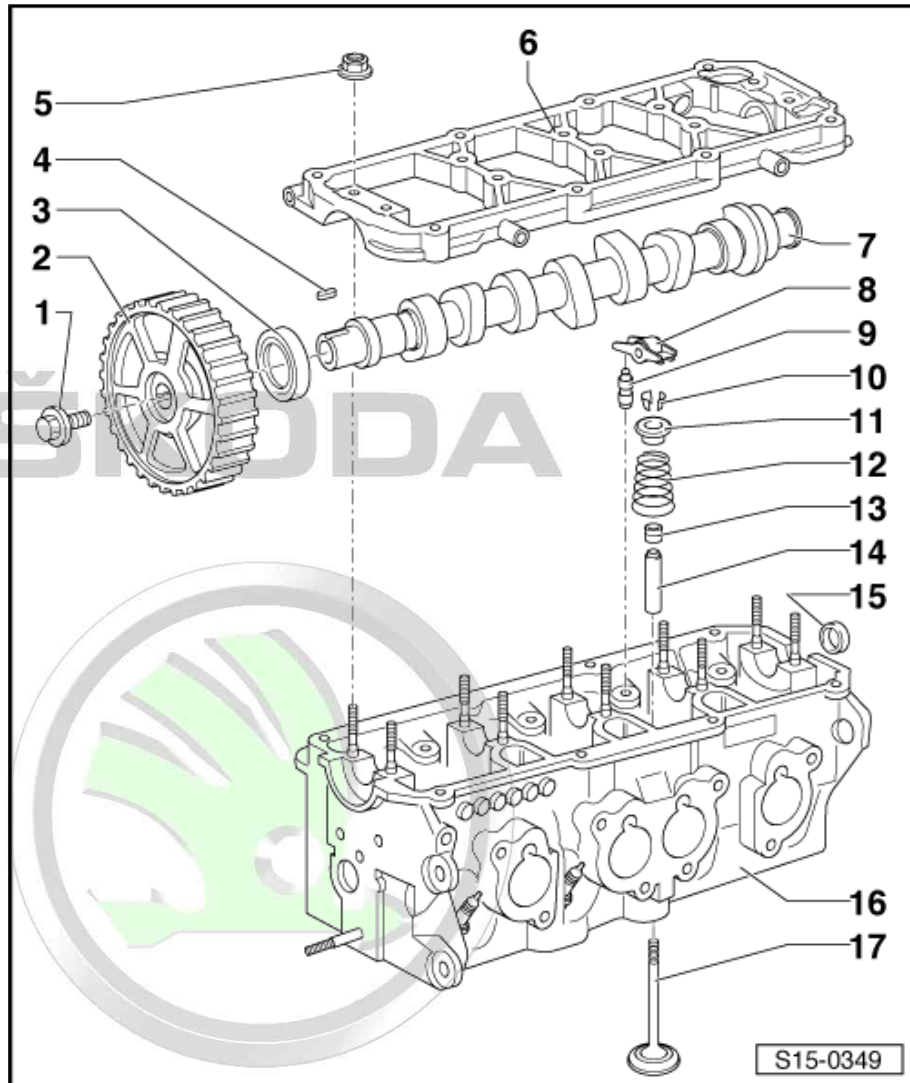
- ☐ check tightness

5 - Nut

- ☐ 23 Nm

6 - Ladder frame

- ☐ with integrated camshaft bearings
- ☐ Bearing 1 at belt pulley side
- ☐ removing and installing
⇒ ["2.3 Removing and installing camshaft", page 76](#)
- ☐ reworking sealing surface not permissible



7 - Camshaft

- ☐ Inspecting axial play ⇒ [Fig. "Checking the axial play of the camshaft", page 73](#)
- ☐ removing and installing ⇒ ["2.3 Removing and installing camshaft", page 76](#)
- ☐ Slack: max. 0.04 mm

8 - Roller rocker arm

- ☐ do not interchange
- ☐ inspect roller bearings
- ☐ oil contact surface
- ☐ for installing, clip onto the balancing element with the locking clip

9 - Hydraulic supporting element

- ☐ with hydraulic valve clearance compensation
- ☐ check hydraulic valve clearance compensation
⇒ ["2.4 Checking hydraulic balancing elements", page 78](#)
- ☐ do not interchange
- ☐ oil contact surface

10 - Collets

11 - Valve spring retainer

12 - Valve spring

- ☐ with cylinder head removed, remove and install with -MP1-211 (VW 541/1a,/5)- and -MP1-213 (2036)- with valve supporting plate -MP 1-218-

13 - Valve stem seal

- ☐ Renew. ⇒ [“2.6 Replacing valve stem seals”, page 80](#) .

14 - Valve guide

- ☐ check ⇒ [“2.5 Inspect valve guides”, page 79](#)

15 - Screw cap

- ☐ insert flush
- ☐ to remove, pierce in the middle with a screwdriver and lever out

16 - Cylinder head

- ☐ pay attention to the notes ⇒ [“2 Valve gear”, page 71](#)
- ☐ inspecting valve guides ⇒ [“2.5 Inspect valve guides”, page 79](#)
- ☐ reworking valve seats ⇒ [“2.7 Reworking valve seats”, page 82](#)
- ☐ Reworking of sealing surface at camshaft side not permissible

17 - Valve

- ☐ do not re-mill, only grinding with the valve seat is permissible
- ☐ Valve dimensions ⇒ [Fig. “Valve dimensions””, page 73](#)
- ☐ inspecting valve guides ⇒ [“2.5 Inspect valve guides”, page 79](#)
- ☐ reworking valve seats ⇒ [“2.7 Reworking valve seats”, page 82](#)

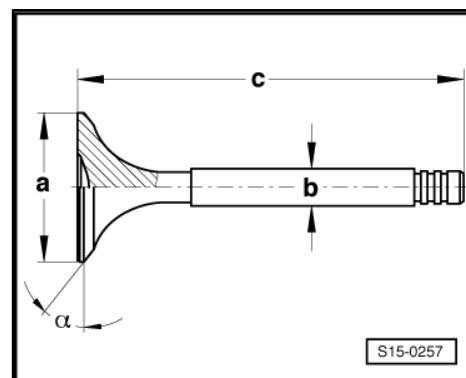
Valve dimensions



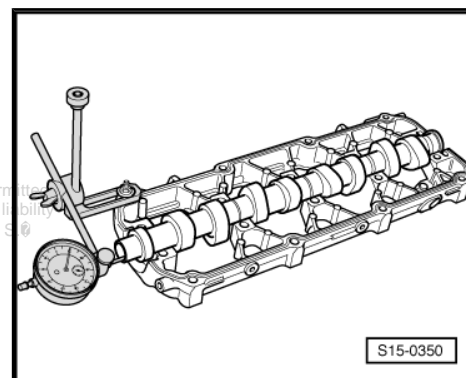
Note

Valves must not be reworked. Only grinding in with grinding paste in the related valve seat is permissible.

Dimension		Inlet valve	Exhaust valve
Ø a	mm	39,5 ± 0,15	32,9 ± 0,15
Ø b	mm	5,980 ± 0,007	5,965 ± 0,007
c	mm	93,85	93,85
α	°	45	45



Checking the axial play of the camshaft



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Special tools and workshop equipment required



- ◆ Universal dial gauge holder - MP3-447 (VW 387)-
- ◆ Dial gauge , e.g. -VAS 6079-

Measurement with ladder frame removed.

Wear limit: max. 0.17 mm

2.2 Replacing camshaft gasket ring

Special tools and workshop equipment required

- ◆ Counterholder - T30004 (3415)-
- ◆ Gasket ring extractor - MP1-215 (2085)-
- ◆ Thrust piece - MP 1-315-
- ◆ Assembly device - T10071-



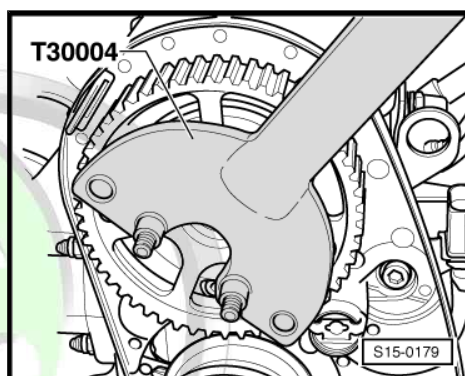
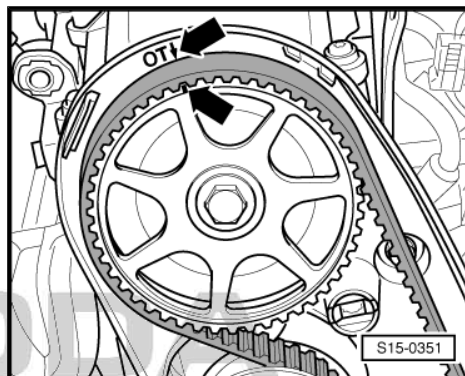
Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

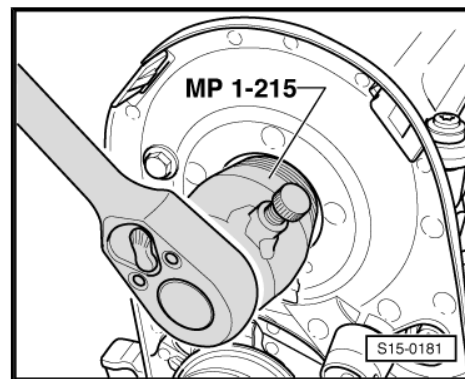
⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8 .

Removing

- Cylinder head fitted
- Remove top toothed belt guard.
- Position camshaft sprocket to TDC marking for cylinder 1 by rotating at crankshaft. The marking on the camshaft sprocket must be aligned with the arrow on the toothed belt guard.
- Slacken tensioning pulley and take timing belt off camshaft sprocket.
- Then turn crankshaft back slightly.
- Loosen the camshaft sprocket, to do so use counterholder - T30004 (3415)- .
- Pull off camshaft sprocket.
- Remove Woodruff key from the camshaft.



- Screw in the fixing screw for the camshaft sprocket by hand up to the stop in the crankshaft to guide the gasket ring extractor.
- Set the inner part of the sealing ring extractor -MP1-215 (2085)- flush with the outer part and interlock with the knurled screw.
- Oil the thread head of the gasket ring extractor -MP1-215 (2085)-, position and forcibly screw into the gasket ring as far as possible.
- Slacken knurled screw and turn inner part of gasket ring extractor against the camshaft until the gasket ring is pulled out.
- Clamp gasket ring extractor into the vice at the flats. Remove gasket ring with pliers.



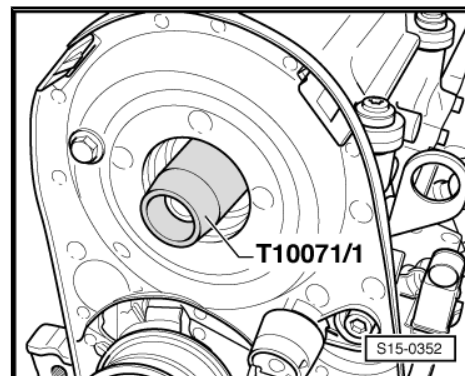
Install



Note

Do not oil sealing lip of the gasket ring.

- Slide gasket ring over the guide bushing -T10071/1- .
- Remove guide bushing.



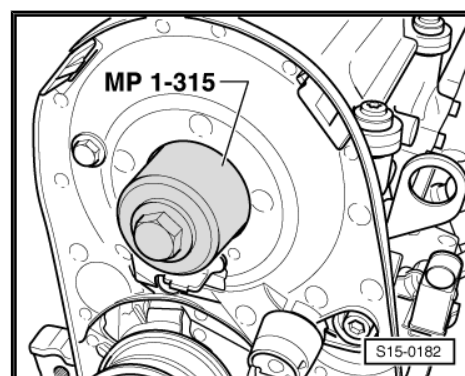
- Press in the gasket ring with insertion sleeve -MP 1-315- and screw -T10071/2- up to the stop.



Note

Place a larger commercially available M12 washer below the bolt in order to avoid wear to the insertion sleeve.

- Set the Woodruff key in the camshaft.





- Tighten the camshaft sprocket, to do so use counterholder - T30004 (3415)- .

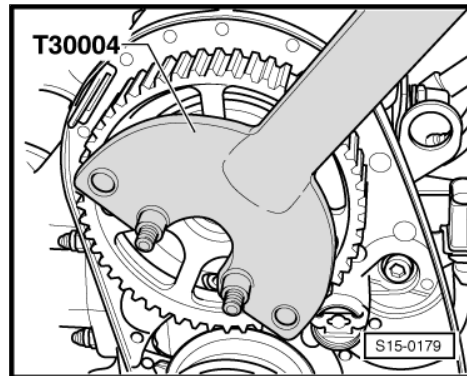
Tightening torque: 100 Nm



Note

When turning the camshaft the valves may touch the piston in TDC. Therefore the pistons must not be at TDC. Risk of damaging valves and pistons.

- install (set the timing)
⇒ [“1.4 Removing and installing toothed belt”, page 36](#) .



2.3 Removing and installing camshaft

Special tools and workshop equipment required

- ◆ Counterholder - T30004 (3415)-
- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ◆ Cleaning and degreasing agent , e.g. -D 009 401 04-
- ◆ Protective goggles and gloves
- ◆ Sealant - D 188 800 A1-



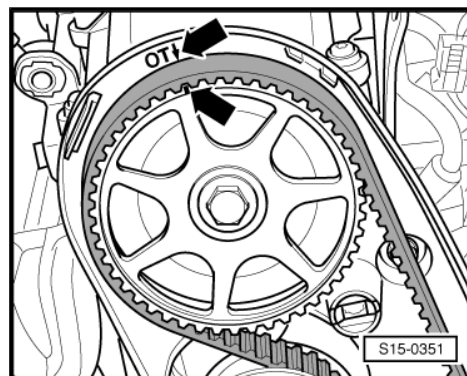
Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

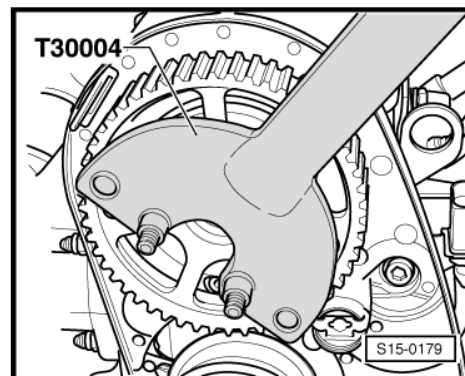
⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#) .

Removing

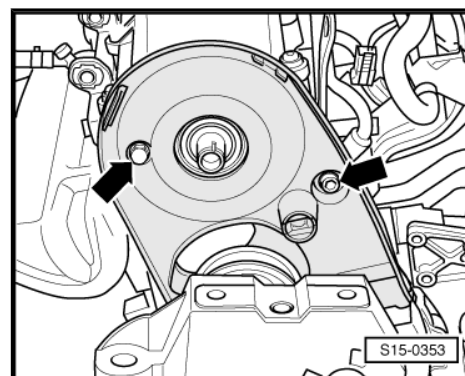
- Cylinder head fitted.
- Removing the intake manifold
⇒ [“1.2 Assembly overview - intake manifold”, page 175](#) .
- Remove top toothed belt guard.
- Position camshaft sprocket to TDC marking for cylinder 1 by rotating at crankshaft. The marking on the camshaft sprocket must be aligned with the arrow on the toothed belt guard.
- Slacken tensioning pulley and take timing belt off camshaft sprocket.



- Loosen the camshaft sprocket, to do so use counterholder - T30004 (3415)- .
- Pull off camshaft sprocket.
- Remove Woodruff key from the camshaft.
- Slacken the bolts for the cylinder head cover from the outside to the inside.
- Remove cylinder head cover.



- Unscrew rear toothed belt guard from cylinder head -arrows-.
- Unscrew the nuts of bearings 5, 1 and 3. Then, slacken bearings 2 and 4 alternately diagonally across.
- Take off ladder frame.
- Take out camshaft.
- Remove the roller rocker arms together with the balancing elements. Lay aside on a clean surface.
- Ensure that the roller rocker arms and the supporting elements are not mixed up.



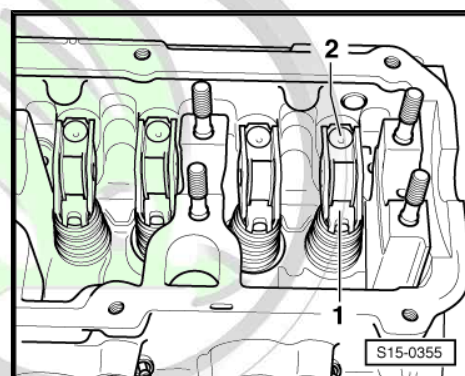
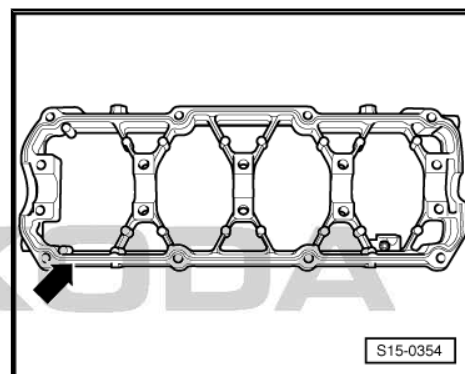
Install



WARNING

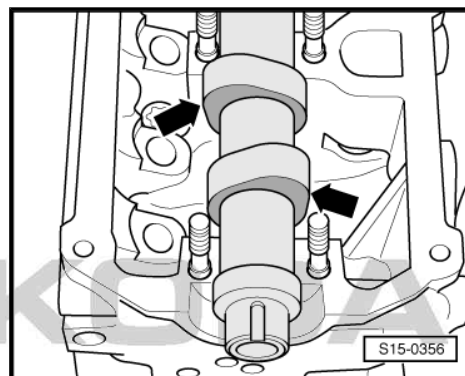
Wear protective gloves and goggles when working with gasket remover and degreasing agent!

- Remove the old sealant from the groove -arrow- of the ladder frame as well as from the sealing surfaces and the cylinder head using a chemical sealant remover.
- Degrease the sealing surfaces.
- Cut off nozzle tube at the front marking (\varnothing of nozzle approx. 1 mm).
- Insert the hydraulic supporting elements in the cylinder head and position the relevant roller rocker arm on the valve stem ends or supporting elements.
- Ensure that all the roller rocker arms are correctly positioned on the valve stem ends -1- and are clipped in place on the relevant balancing elements -2-.
- Oil contact surfaces of camshaft.

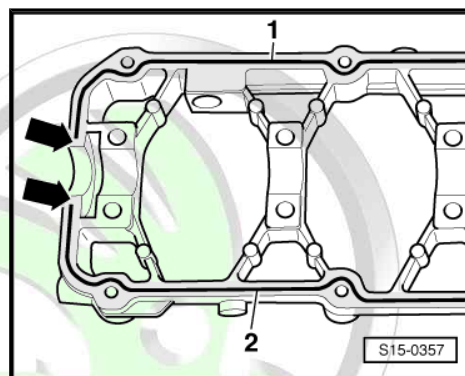




- Position camshaft in TDC position of cylinder 1:
- At the camshaft, the cams of cylinder 1 must be pointing up evenly -arrows-.



- Apply an even, thin layer of sealant -D 188 800 A1- -1- and -2- into the clean groove of the ladder frame.
- Apply a thin layer of sealant on the surfaces before the ends of the sealant bead -arrows- as well as onto the sealing surface.



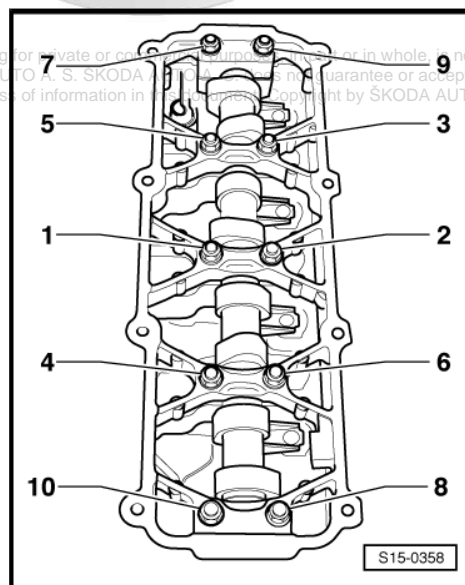
Note

- ◆ The sealant must not be applied too thick. Wipe off any excess sealant with a non-fluffing cleaning cloth.
- ◆ The positioning and screwing of the ladder frame should be carried out without any interruptions as the sealing surfaces, once they come into contact, begin to harden right away.

- Insert the rear screw cap -15- ➔ [Item 15 \(page 73\)](#) flush.
- Position ladder frame and slightly tighten the nuts -3-, -4-, -5-, -6- in several stages crosswise.
- Then, slightly tighten the nuts -1-, -2-, -7-, -8-, -9-, -10-.
- Then tighten the nuts in the sequence -1...10-.

Tightening torque: 23 Nm

- Replacing camshaft gasket ring
➔ ["2.2 Replacing camshaft gasket ring", page 74](#) .
- install (set the timing)
➔ ["1.4 Removing and installing toothed belt", page 36](#) .



Note

- ◆ After installing the ladder frame and the cylinder head cover, allow the sealant to dry for about 30 minutes.
- ◆ After installing the camshaft, the engine must not be started for about 30 minutes. The hydraulic clearance compensation elements must settle (otherwise valves would strike the pistons).
- ◆ After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.

2.4 Checking hydraulic balancing elements

Special tools and workshop equipment required

- ◆ Feeler gauges

i Note

- ◆ *Hydraulic balancing elements cannot be repaired.*
- ◆ *Irregular valve noises when starting engine are normal.*
- Start engine and allow to run until the radiator fan has cut in once.
- Increase engine speed to about 2500 rpm for 2 minutes and undertake a test drive if necessary.

i Note

If the irregular valve noises disappear but occur regularly during short trips then the oil return-flow check tube must be replaced. Fitting location of the oil return-flow check tube: in the oil filter holder

⇒ *["1.2 Summary of components - oil filter holder", page 89](#).*

If the hydraulic balancing elements are still loud, determine which is the faulty balancing element as follows:

- Turn the crankshaft until the cam of the balancing element to be tested is positioned on top, while doing so push the vehicle forward in 4th gear when ignition is switched off.

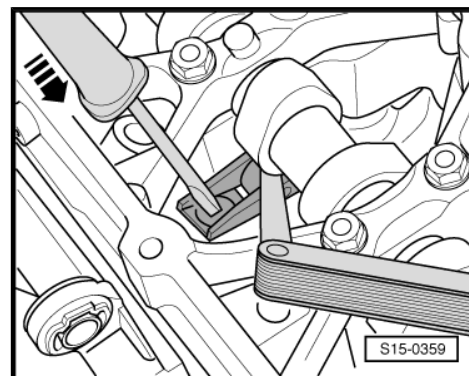
- Determine the play between the cams and the roller rocker arm.
- Press the roller rocker arm down with a screwdriver -arrow-.

If a feeler gauge of 0.20 mm can be slipped between the cams and the roller rocker arm:

- Replace balancing element
⇒ *["2.3 Removing and installing camshaft", page 76](#).*

i Note

- ◆ *After installing the camshaft, the engine must not be started for about 30 minutes. The hydraulic clearance compensation elements must settle (otherwise valves would strike the pistons).*
- ◆ *After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.*



2.5 Inspect valve guides

Universal dial gauge holder - MP3-447 (VW 387)-



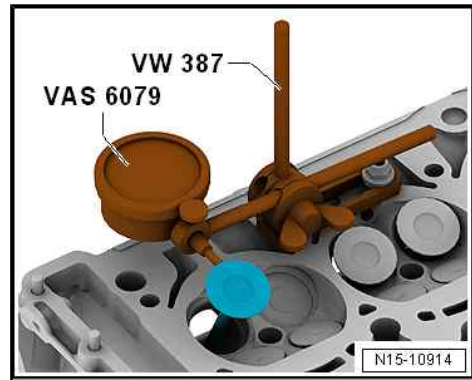
Dial gauge , e.g. -VAS 6079-

- Insert valve into valve guide.
- The end of valve stem must be flush with guide.
- Determine valve rock.
- Tread wear indicator, valve rock: 0.6 mm.



Note

- ♦ *If the wear limit is exceeded, repeat measurement with new valves. If the wear limit is again exceeded, replace cylinder head. The valve guides cannot be changed.*
- ♦ *If the valve is replaced when carrying out repair work, use a new valve for the measurement.*



2.6 Replacing valve stem seals

With cylinder head installed

Special tools and workshop equipment required

- ♦ Valve stem seal extractor - MP1-230 (3364)-
- ♦ Pressure hose - MP1-210 (VW 653/3)-
- ♦ Valve lever - MP1-211 (VW 541/1a,/5)-
- ♦ Valve stem seal insertion tool - MP1-233 (3365)-
- ♦ Assembly device - MP1-213 (2036)-
- ♦ Spark plug wrench , e.g. -3122B-
- ♦ Extractor - T10112A-



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ ["2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)", page 8](#) .

Removing

- Remove the camshaft
⇒ ["2.3 Removing and installing camshaft", page 76](#) .
- Remove the roller rocker arm together with the balancing element. Lay aside on a clean surface.
- Ensure that the roller rocker arm and the balancing element is not mixed up.
- Use extractor -T10112- to unplug spark plug connector and unscrew spark plugs with spark plug wrench.
- Put the piston of the relevant cylinder at "bottom dead centre".

- Insert the assembly device -MP1-213 (2036)- and adjust bearing to the stay bolt height.
- Screw the pressure hose -MP1-210 (VW 653/3)- into the spark plug thread and apply a constant pressure of at least 0.6 MPa (6 bar) into the cylinder.
- Remove valve springs with valve lever -MP1-211 (VW 541/1a,/5)- .



Note

If valve collets are tight, slacken with slight blows of a hammer on the valve lever.

- Pull off valve stem seal with extractor for valve stem seal - MP1-230 (3364)- .

Install

- In order to avoid damage to the new valve stem seals, fit the supplied plastic sleeve -A- onto the valve stem.
- Oil valve stem seal -B-, insert into the valve stem seal insertion tool -MP1-233 (3365)- and carefully push onto the valve guide.
- Remove plastic sleeve.

Further installation occurs in reverse order to removal.



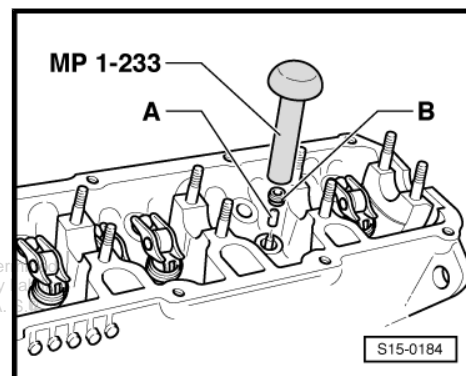
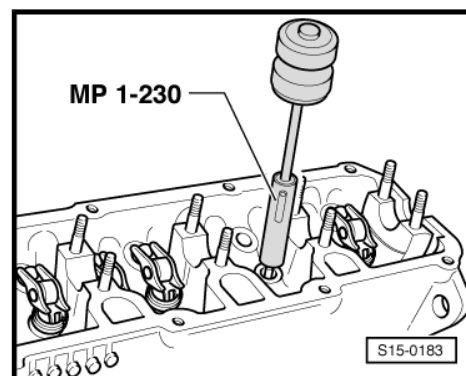
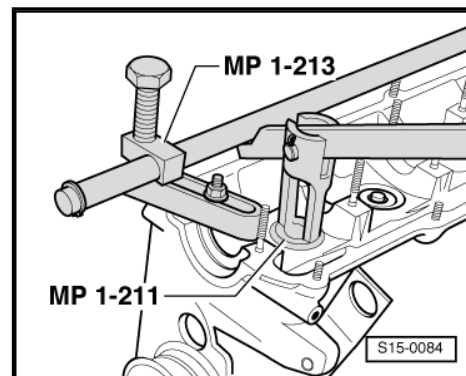
Note

After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.

With cylinder head removed

Special tools and workshop equipment required

- ◆ Spark plug wrench , e.g. -3122B-
- ◆ Valve supporting plate - MP 1-218-
- ◆ Assembly device - MP1-213 (2036)-
- ◆ Valve lever - MP1-211 (VW 541/1 a /5)-
- ◆ Valve stem seal extractor - MP 1-230-
- ◆ Valve stem seal insertion tool - MP1-233 (3365)-
- Cylinder head and camshaft removed.
- Components removed (intake manifold, exhaust manifold, spark plugs etc.).





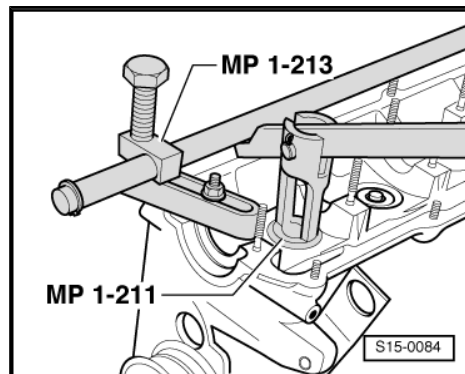
Removing

- Fit cylinder head onto the valve supporting plate.
- Insert the assembly device -MP1-213 (2036)- and adjust bearing to the stay bolt height.
- Remove valve springs with valve lever -MP1-211 (VW 541/1a,5)- .



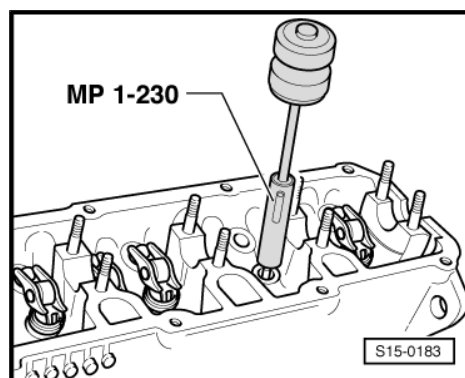
Note

If valve collets are tight, slacken with slight blows of a hammer on the valve lever.



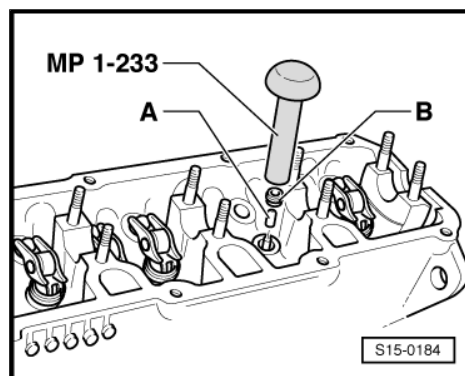
- Pull off valve stem seal with extractor for valve stem seal -MP 1-230- .

Install



- In order to avoid damage to the new valve stem seals, fit the supplied plastic sleeve -A- onto the valve stem.
- Oil valve stem seal -B-, insert into the valve stem seal insertion tool -MP1-233 (3365)- and carefully push onto the valve guide.
- Remove plastic sleeve.

Further installation occurs in reverse order to removal.



2.7 Reworking valve seats



Note

If no perfect contact pattern is achieved by grinding in the valve seats, rework the valve seats.

Special tools and workshop equipment required

- ◆ Depth gauge/caliper gauge
 - ◆ NAC milling cutter for reworking valve seats
 - ◆ Grinding paste
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i Note

- ◆ When carrying out repairs on engines with leaking valves, it is not sufficient to machine or replace the valve seats and valves. It is also necessary to inspect the valve guides for wear, particularly on engines with a high mileage
⇒ ["2.5 Inspect valve guides", page 79](#).
- ◆ Rework valve seats only sufficiently in order to obtain a proper contact pattern.
- ◆ Calculate the maximum permissible reworking dimension before commencing.
- ◆ If the reworking dimension is exceeded, proper operation of the hydraulic valve clearance compensation is no longer assured and the cylinder head must be replaced.

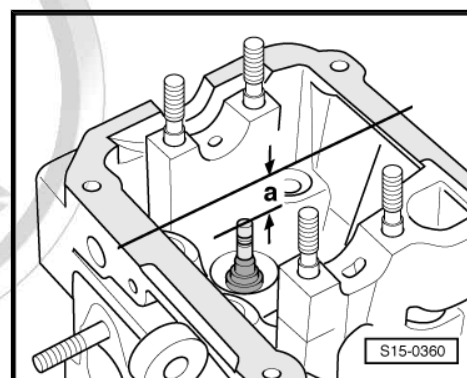
Calculating max. permissible reworking dimension

- Insert valve and press firmly against the valve seat.

i Note

If the valve is replaced when carrying out repair work, use a new valve for the measurement.

- Measure distance -a- between the valve stem ends (upper edge) and the upper cylinder head surface with depth gauge.
- Calculate max. permissible reworking dimension from the distance measured and the minimum dimension.
- Minimum dimension for inlet and exhaust valve: 31.7 mm.



Measured distance less minimum dimension = max. permissible reworking dimension.

Example for inlet valve:

measured distance -a-	32.0 mm
- Minimum dimension	- 31.7 mm
= max. permissible reworking dimension	= 0.3 mm

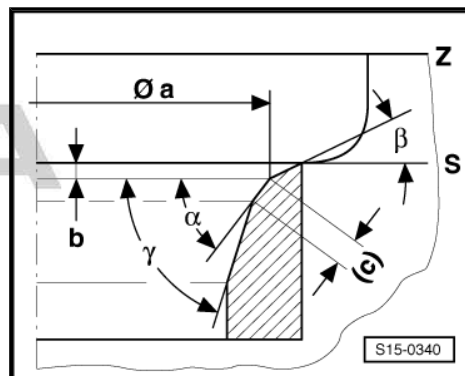
i Note

If the max. permissible reworking dimension is 0 mm or less than 0 mm, repeat measurement with a new valve. If the measuring result is still 0 mm or less than 0 mm, replace cylinder head.



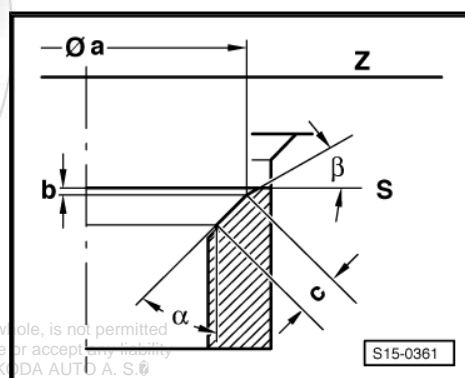
Reworking inlet valve seat

Di- men- sion	Inlet valve seat	
$\varnothing a$	mm	39,2
b	mm	max. permissible reworking dimension
c	mm	1,8 ... 2,2
Z	Bottom edge of cylinder head	
α	45° valve seat angle	
β	30° top correction angle	
γ	60° bottom correction angle	
S	Combustion chamber surface area	



Reworking exhaust valve seat

Di- men- sion	Exhaust valve seat	
$\varnothing a$	mm	32.4 mm
b	mm	max. permissible reworking dimension
c	mm	2.2 ... 2.6 mm
Z	Bottom edge of cylinder head	
α	45° valve seat angle	
β	30° top correction angle	
S	Combustion chamber surface area	



Note

The exhaust valve seat rings are additionally provided with a restriction. During rework ensure that the radius of the restriction is not damaged.

Work procedure

Reworking can be carried out by hand while complying with the following conditions:

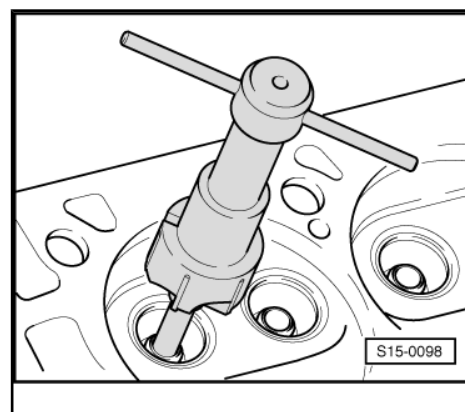
- Wear limit of valve guides must not exceed the permissible dimension ➔ [“2.5 Inspect valve guides”, page 79](#).
- Use NAC milling cutter with carbide metal tips (min. 90 HRC).
- Press on the milling cutter using slight pressure and mill in such a way that an even removal of swarfs is ensured over the whole working surface.

Reworking valve seats with NAC milling cutter

- Place cylinder head on a felt base and secure to prevent it from turning.
- Match diameter of guide drift to diameter of valve guide.

Valve guide	Ø Guide drift in mm
Inlet valve	6,0 -0,01
Exhaust valve	

- Match diameter of milling cutter to diameter of valve seat.

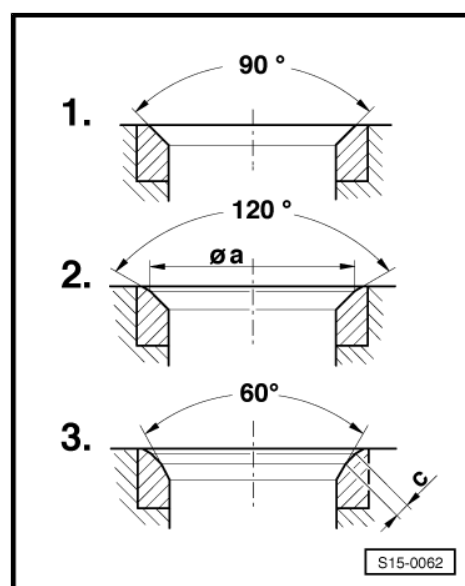


Milling sequence

1 - Mill valve seat with 90° milling cutter until a perfect contact pattern is achieved. (Do not exceed maximum permissible reworking dimension!)

2 - Chamfer top correction angle with 120° milling cutter until the valve seat diameter -a- (⇒ [page 84](#)) is achieved.

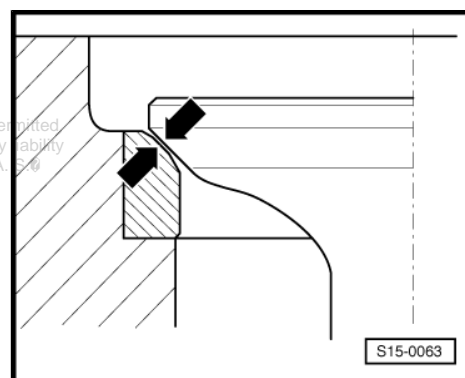
3 - Mill bottom correction angle with 60° milling cutter until valve seat width -c- (⇒ [page 84](#)) is achieved. pay attention to the notes ⇒ [page 84](#).



- Grind in valve/valve seat with fine grinding paste so as to achieve a perfect contact pattern -arrows-.
- Check contact pattern e.g. with water colour (perfect contact pattern over entire circumference).
- Install valve springs.
- Inspect valve for tightness.

The tightness of the valves can be checked by filling petrol into the inlet and outlet canal (no petrol must flow out at the valve seat).

After the repair measure the dimension -a- again and calculate the maximum permissible reworking dimension ⇒ [page 83](#).



Note

If the reworking dimension is exceeded, proper operation of the valve gear is no longer assured and the cylinder head must be replaced.



17 – Lubrication

1 Removing and installing parts of the lubrication system

⇒ [“1.1 Lubrication system - Summary of components”, page 86](#)

⇒ [“1.2 Summary of components - oil filter holder”, page 89](#)

⇒ [“1.3 Removing and installing oil pan”, page 90](#)

⇒ [“1.4 Removing and installing oil pump”, page 92](#)

⇒ [“1.5 Testing oil pressure and oil pressure switch”, page 93](#)

1.1 Lubrication system - Summary of components



Note

If considerable quantities of metal swarf or abrasion is found in the engine oil when carrying out engine repairs, carefully clean the oil galleries in order to avoid consequential damage and additionally replace the engine oil cooler.

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1 - Screw

- ☐ 15 Nm

2 - Support

- ☐ for wiring loom of oil level and oil temperature sender

3 - Pressure relief valve

- ☐ Opening pressure: 0.13...0.16 MPa (1.3...1.6 bar) overpressure
- ☐ is mounted in the engines with identification characters BGU
- ☐ 27 Nm

4 - Oil injection nozzle

- ☐ for cooling pistons
- ☐ is mounted in the engines with identification characters BGU

5 - Dipstick

- ☐ The oil level must not be above the max. mark!

6 - Hopper

- ☐ Remove for extracting oil

7 - Guide tube

8 - Centring sleeves

- ☐ 2 pieces

9 - O-ring

- ☐ Replace after disassembly

10 - Suction line

- ☐ Clean strainer if dirty

11 - Partition panel

12 - Oil pan

- ☐ removing and installing ⇒ [“1.3 Removing and installing oil pan”, page 90](#)
- ☐ with oil level and oil temperature sender -G266-

13 - Sealing ring

- ☐ Replace after disassembly

14 - Oil drain plug

- ☐ if the screw has an integrated gasket ring - replace
- ☐ 30 Nm

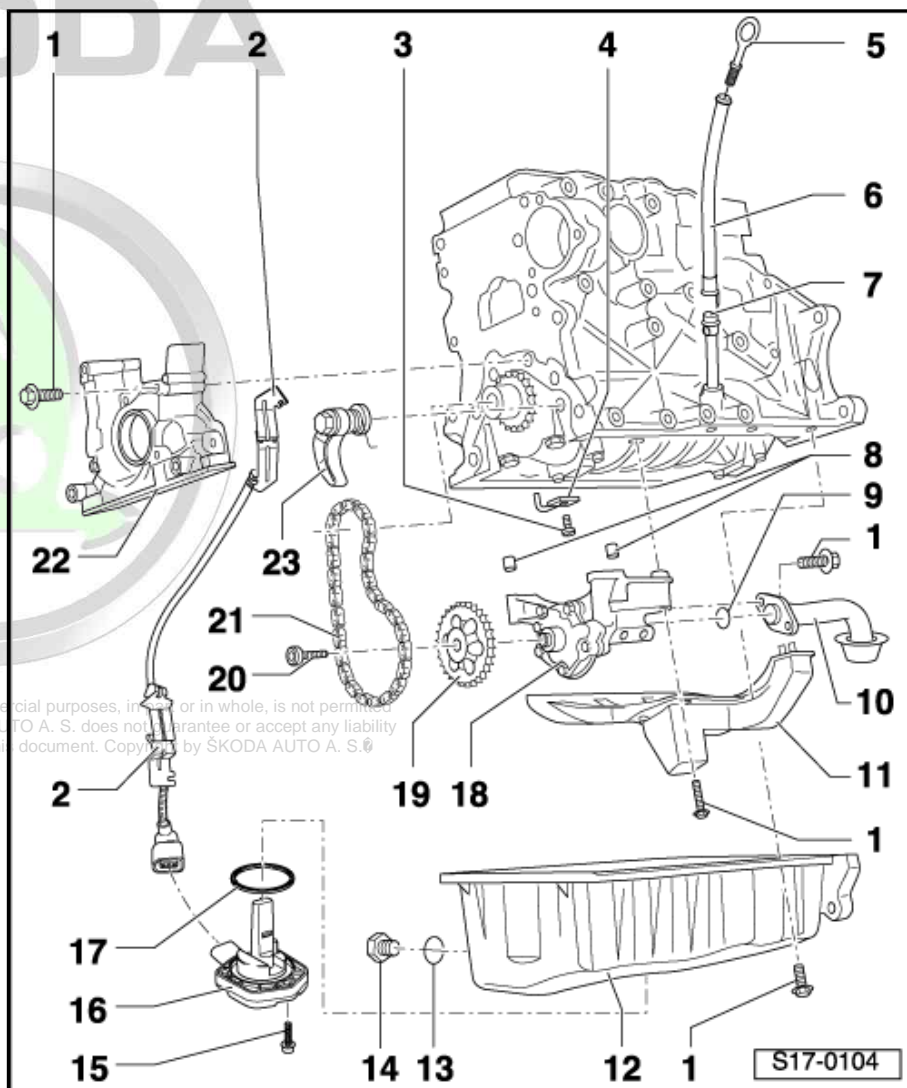
15 - Screw

- ☐ Replace after disassembly
- ☐ 10 Nm

16 - Oil level and oil temperature sender -G 266-

17 - Sealing ring

- ☐ Replace after disassembly
- ☐ Moisten with oil before installing





18 - Oil pump

- ☐ with pressure relief valve 1.2 MPa (12 bar)
- ☐ Before installing, check whether both dowel sleeves Pos. -8- for centring the oil pump/cylinder block are present
- ☐ if there is any scoring on contact surfaces and gears, replace
- ☐ removing and installing ⇒ ["1.4 Removing and installing oil pump", page 92](#)

19 - Oil pump sprocket

- ☐ Fits onto oil pump shaft in one position only

20 - Screw

- ☐ Replace after disassembly
- ☐ 20 Nm + 90°

21 - Oil pump chain

- ☐ before removing mark running direction
- ☐ check for wear

22 - Front sealing flange

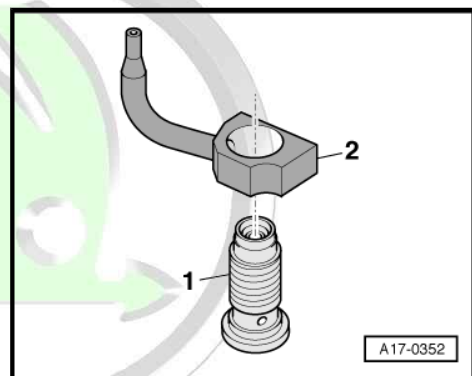
- ☐ removing and installing
⇒ ["2.3 Removing and installing the sealing flange on the belt pulley side", page 47](#)
- ☐ install with silicone sealant
- ☐ Replace crankshaft seal on belt pulley side
⇒ ["2.2 Replacing crankshaft sealing ring - belt pulley end", page 45](#)

23 - Chain tensioner

- ☐ do not disassemble
- ☐ Check fitting position
- ☐ When installing, pretension spring and attach
- ☐ 15 Nm

Oil spray nozzle and pressure relief valve - are mounted in the engines with identification characters BGU

- 1 - Screw with pressure relief valve
- 2 - Oil spray nozzle (for cooling piston)



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1.2 Summary of components - oil filter holder

1 - O-ring

- ☐ Replace after disassembly
- ☐ slide onto the pipe -2- up to the collar
⇒ [Item 2 \(page 89\)](#)
- ☐ is mounted in the engines with identification characters BGU

2 - Pipe

- ☐ for crankcase ventilation
- ☐ is mounted in the engines with identification characters BGU

3 - To vent housing under the cap

4 - Spring strap clamp

- ☐ is mounted in the engines with identification characters BGU

5 - Retaining clip

- ☐ is mounted in the engines with identification characters BGU

6 - Screw plug

- ☐ 15 Nm

7 - Sealing ring

- ☐ cut open if leaking and replace

8 - 0.14 MPa (1.4 bar) oil pressure switch -F1-

- ☐ black insulation
- ☐ check ⇒ ["1.5 Testing oil pressure and oil pressure switch", page 93](#)
- ☐ 25 Nm

9 - Sealing ring

- ☐ cut open if leaking and replace

10 - Oil filter holder

- ☐ with pressure relief valve approx. 0.4 MPa (4 bar)

11 - Screw

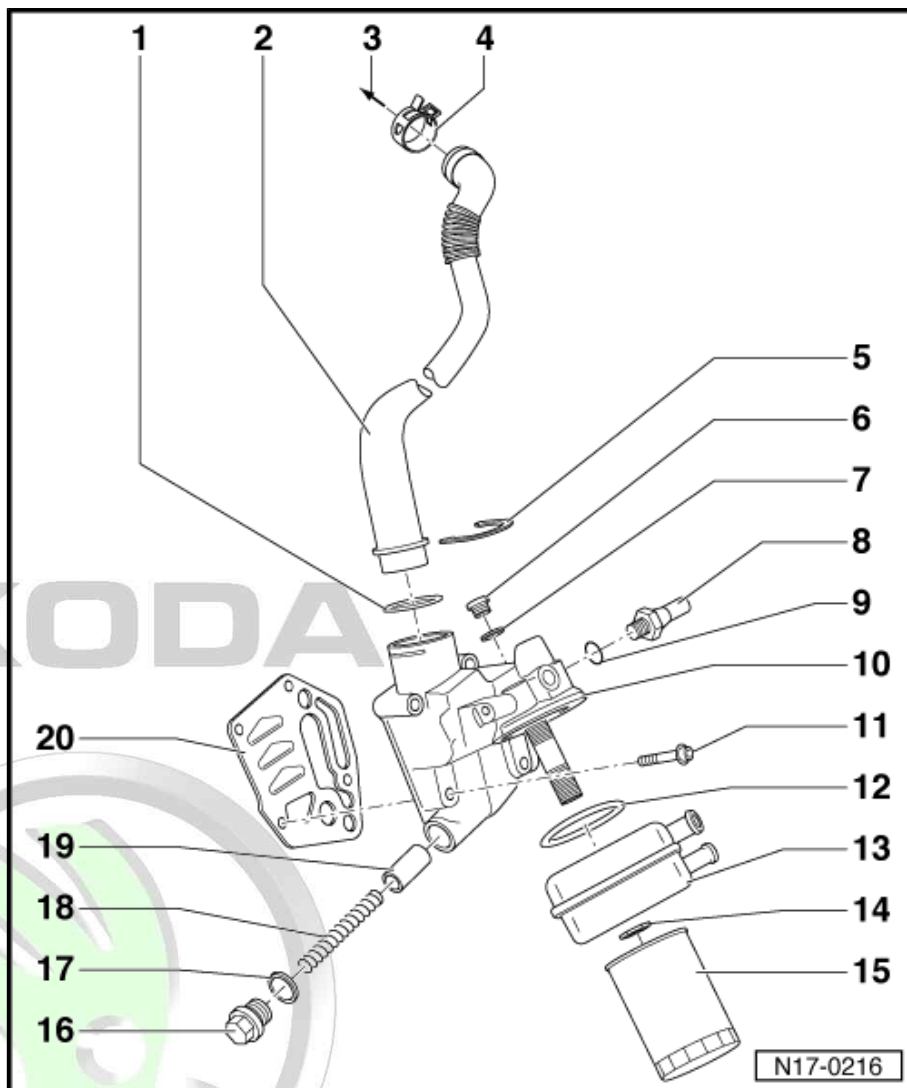
- ☐ Replace after disassembly
- ☐ 15 Nm + 90°

12 - Gasket

- ☐ Replace after disassembly
- ☐ fit into the grooves on the engine oil cooler
- ☐ is mounted in the engines with identification characters BGU

13 - Engine oil cooler

- ☐ pay attention to the notes ⇒ ["1 Removing and installing parts of the lubrication system", page 86](#)
- ☐ ensure clearance to surrounding components





- ☐ Connection diagram for coolant hoses
⇒ [“1.4 Connection diagram for coolant hoses - Engines with identification characters BGU, BSE, BSF”, page 103](#) .
- ☐ is mounted in the engines with identification characters BGU

14 - Nut

- ☐ 25 Nm

15 - Oil filter

- ☐ slacken with tensioning strap
- ☐ tighten by hand
- ☐ pay attention to installation instructions on oil filter

16 - Screw plug

- ☐ 40 Nm

17 - Sealing ring

- ☐ Replace after disassembly

18 - Spring

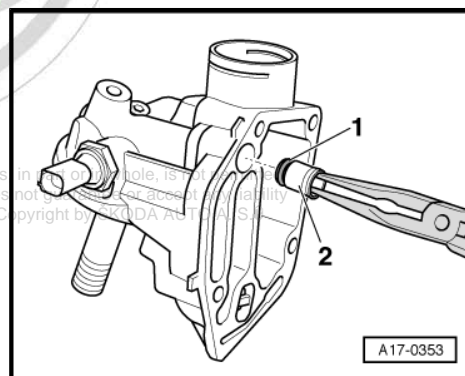
19 - Piston

20 - Gasket

- ☐ Replace after disassembly

Remove and install oil return-flow check tube

- Oil filter holder removed.
- Pull out oil return-flow check tube -2- under rotating movements with pointed pliers.
- Replace the gasket ring -1-.
- Press in the new oil return-flow check tube up to the stop.



1.3 Removing and installing oil pan

Special tools and workshop equipment required

- ◆ Flexible-head wrench 10 - 3185-
- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ◆ Cleaning and degreasing agent , e.g. -D 009 401 04-
- ◆ Protective goggles and gloves
- ◆ Silicone sealant ⇒ Electronic catalogue of original parts (ET-KA)



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#) .

Removing

- Remove the sound dampening system ⇒ Body Work; Rep. gr. 50 .
- Drain engine oil.
- Disconnect plug connection at oil level and oil temperature sender -G266- .
- Release the oil pan's fixing screws.

Note

Slacken oil pan bolts at flywheel side with hinged wrench -3185- and unscrew with wrench socket.

- Remove oil pan, if necessary release by applying slight blows with a rubber-headed hammer.



WARNING

Wear protective gloves and goggles when working with gasket remover and degreasing agent!

- Remove the remaining sealant from the sealing surface on the cylinder block (while doing so remove the baffle) and on the oil pan with chemical sealant remover.
- Degrease the sealing surfaces.

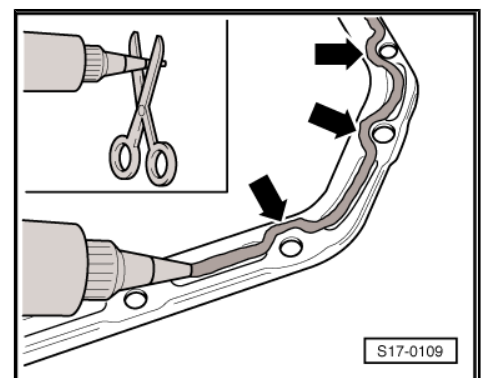
Install

Installation is performed in the reverse order, pay attention to the following points:

Note

Pay attention to the use by date on sealant.

- Cut off nozzle tube at the front marking (Ø of nozzle approx. 3 mm).



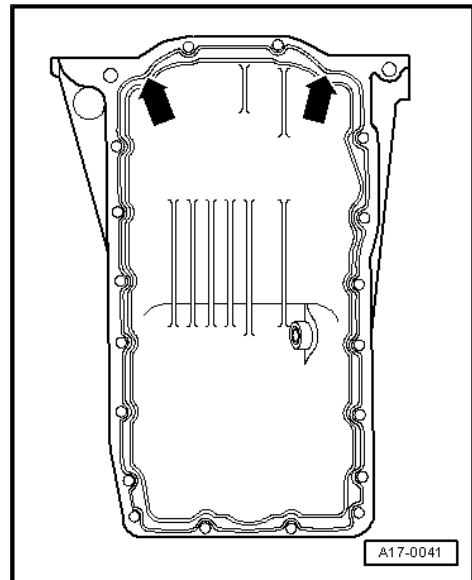


- Apply silicone sealant bead to the clean sealing surface of the oil pan, as shown.
- ♦ Thickness of sealant bead: 2 ... 3 mm.

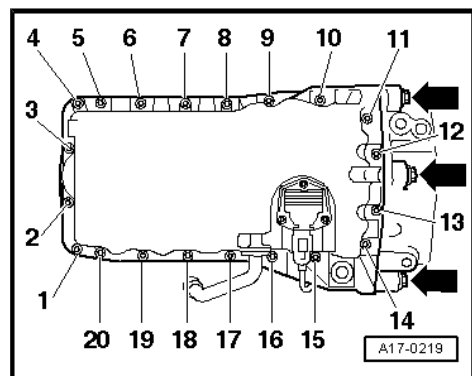


Note

- ♦ *The sealant bead must not be thicker than recommended otherwise excess sealant may get into the oil pan and clog the strainer in the oil suction pipe.*
- ♦ *Take particular care when applying sealant bead in the area of the sealing flange at the rear -arrows-.*
- ♦ *The oil pan must be installed within 5 minutes after applying the silicone sealant.*



- Fit on oil pan immediately and tighten the bolts in the following order:
- 1 - Tighten all the bolts of oil pan/cylinder block slightly diagonally across.
- 2 - Tighten the three bolts of oil pan/cylinder block slightly.
- 3 - Tighten all the bolts of oil pan/cylinder block slightly diagonally across.
- 4 - Tighten the three bolts of oil pan/gearbox to 40 Nm.
- 5 - Tighten all the bolts of oil pan/cylinder block diagonally across to 15 Nm.



Note

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- ♦ *When installing the oil pan with the engine removed, ensure that the oil pan is flush with the cylinder block at the flywheel side.*
- ♦ *After installing the oil pan, allow the sealant to dry for about 30 minutes. Only then may engine oil be filled in.*

Further installation occurs in reverse order to removal.

1.4 Removing and installing oil pump



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ *"2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8* .

Removing

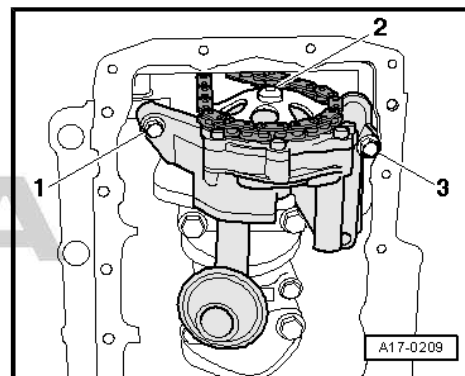
- Remove oil pan and baffle
⇒ *"1.3 Removing and installing oil pan", page 90* .

- Unscrew bolt -2-.
- Pull the chain sprocket off the oil pump shaft.
- Release screws -1- and -3- and remove oil pump.

Install

Installation is performed in the reverse order, pay attention to the following points:

- Insert dowel sleeves -8- ➔ [Item 8 \(page 87\)](#) onto the top of the oil pump.
- Fitting position: The oil pump shaft/chain sprocket can only be inserted in one position.
- Installing the oil pan
➔ [“1.3 Removing and installing oil pan”, page 90](#).



1.5 Testing oil pressure and oil pressure switch

Special tools and workshop equipment required

- ◆ Oil pressure tester , e.g. -V.A.G 1342-
- ◆ Voltage tester , e. g. -V.A.G 1527 B-
- ◆ Measuring tool set , e.g. -V.A.G 1594 C-



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG) or in whole, is not permitted
➔ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#).

Test conditions

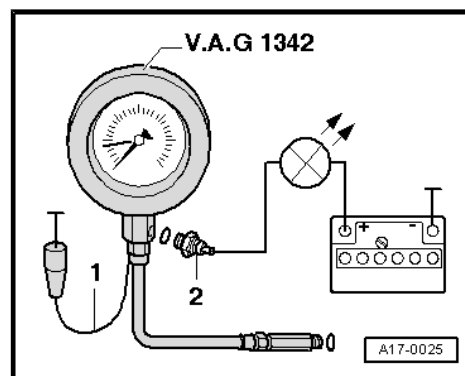
- Engine oil level o.k., test ➔ Maintenance ; Booklet Octavia II.
- Engine oil temperature approx. 80 C.



Note

Functional test and repair of the visual and acoustic oil pressure display ➔ Vehicle diagnostic tester.

- Remove oil pressure switch -F1- and screw into oil pressure tester.
- Screw the oil pressure tester into the hole for the oil pressure switch.



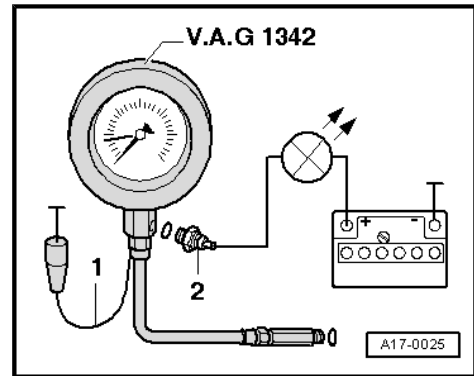


Testing oil pressure switch

- Connect brown cable -1- of oil pressure tester to earth (-).
- Unclamp the voltage tester with its auxiliary cables out of the measuring tool set on the oil pressure switch and plus (+) terminal of the battery.
- The LED should not light up.

If the LED lights up:

- Replace oil pressure switch.
- Start engine.



Note

Observe the testing equipment and the LED while actuating the starter since the switching point of the oil pressure switch can already be exceeded when starting up.

- The LED must come on at an overpressure of 0.12 to 0.16 MPa (1.2 to 1.6 bar).

If the LED does not light up:

- Replace oil pressure switch.

Testing oil pressure

- Start engine (engine oil temperature about 80 °C).
- Oil pressure in idle: min. 0.12 MPa (1.2 bar).
- Oil pressure at 2000 rpm: 0.27...0.45 MPa (2.7... 4.5 bar).

If the specified values are not reached:

- Replace oil filter holder with pressure relief valve Pos. -10-
⇒ [Item 10 \(page 89\)](#) or oil pump
⇒ ["1.4 Removing and installing oil pump", page 92](#).

At a higher engine speed the oil pressure must not be greater than 0.7 MPa (7.0 bar).

If the specified pressure is exceeded:

- Inspect oil galleries.
- Replace the oil filter with the pressure relief valve as required.
- Replace oil pump
⇒ ["1.4 Removing and installing oil pump", page 92](#)

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19 – Cooling

1 Removing and installing parts of the cooling system

⇒ [“1.1 Parts of the cooling system fitted to body”, page 95](#)

⇒ [“1.2 Summary of components: Parts of cooling system engine side - Engines with identification characters BGU, BSE, BSF”, page 99](#)

⇒ [“1.3 Summary of components: Parts of cooling system engine side - Engines with identification characters CCSA, CHGA, CMXA”, page 101](#)

⇒ [“1.4 Connection diagram for coolant hoses - Engines with identification characters BGU, BSE, BSF”, page 103](#)

⇒ [“1.5 Connection diagram for coolant hoses - Engines with identification characters CCSA, CHGA, CMXA”, page 104](#)

⇒ [“1.6 Connection diagram for coolant hoses - vehicles with auxiliary heating”, page 105](#)

⇒ [“1.7 Draining and filling up coolant”, page 105](#)

⇒ [“1.8 Removing and installing coolant pump”, page 108](#)

⇒ [“1.9 Removing and installing coolant regulator”, page 110](#)

⇒ [“1.10 Removing and installing radiator”, page 111](#)

⇒ [“1.11 Checking the coolant system for leaktightness”, page 114](#)

⇒ [“1.12 Removing and installing fan shroud and radiator fan V7 and V35”, page 117](#)

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1.1 Parts of the cooling system fitted to body

⇒ [“1.1.1 Summary of components - radiator with a radiator fan”, page 96](#)

⇒ [“1.1.2 Summary of components - radiator with two radiator fans”, page 98](#)



WARNING

Hot steam or hot coolant may escape when the compensation bottle is opened. Cover the cap with a cloth and open carefully.



Note

- ◆ When the engine is warm the cooling system is under pressure. If necessary reduce pressure before repairs.
- ◆ The hose connections are secured with spring-type clips. In the event of repairs only use spring-type clips.
- ◆ Use pliers for spring strap clips to fit the spring strap clips.
- ◆ Always replace seals and gasket rings.
- ◆ When installing fit the coolant hoses free of stress, without them touching any other components (pay attention to the markings on the coolant connections).
- ◆ The arrows which are on the coolant pipes and the coolant hose ends must stand opposite to each other.
- ◆ Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8.

1.1.1 Summary of components - radiator with a radiator fan

1 - Top coolant hose

- ☐ To connection fitting at cylinder head

2 - O-ring

- ☐ Replace after disassembly

3 - Radiator

- ☐ removing and installing
⇒ "1.10 Removing and installing radiator", page 111
- ☐ after replacing fill entire system with fresh coolant

4 - Gasket

5 - Screw cap

6 - Connector

7 - Screw

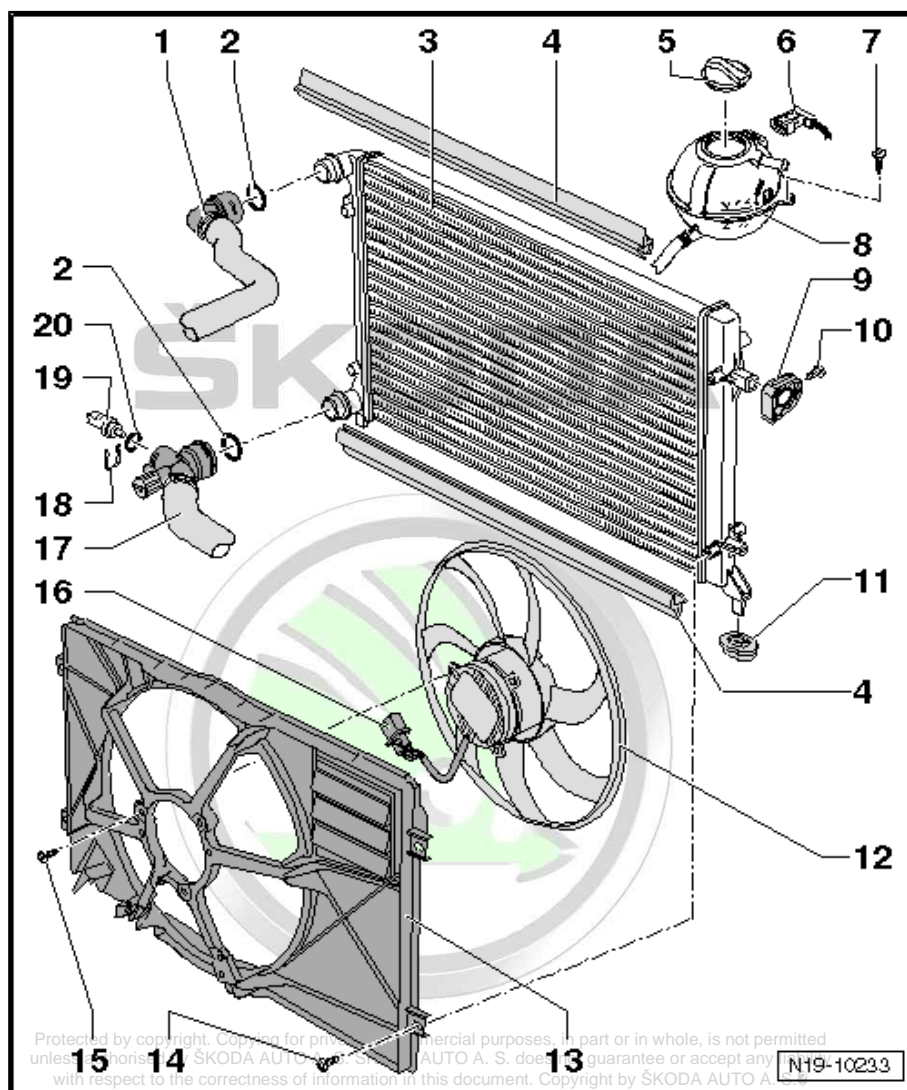
- ☐ 2 Nm

8 - Expansion reservoir

- ☐ Check the cooling system for tightness
⇒ "1.11 Checking the coolant system for leak-tightness", page 114
- ☐ test pressure 0.14...0.16 MPa (1.4...1.6 bar) - positive pressure

9 - Support

- ☐ for radiator



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N19-10233

10 - Screw

- ☐ 5 Nm

11 - Support

12 - Radiator fan - V7-

- ☐ with radiator fan control unit - J293-
- ☐ removing and installing
⇒ ["1.12 Removing and installing fan shroud and radiator fan V7 and V35", page 117](#)

13 - Fan shroud

- ☐ removing and installing
⇒ ["1.12 Removing and installing fan shroud and radiator fan V7 and V35", page 117](#)

14 - Screw

- ☐ 5 Nm

15 - 5 Nm

16 - Connector

17 - Bottom coolant hose

- ☐ to the connection fitting for the coolant regulator

18 - Retaining clip

19 - Thermoswitch/senders

Depending upon vehicle equipment:

- ☐ Thermoswitch for radiator fan - F18-
- ☐ three-pin plug

switching temperatures:

- ☐ 1. Stage: 92 - 97 °C on; 84 °C off
- ☐ 2. Stage: 99 - 105 °C on; 91 °C off

or

- ☐ Coolant temperature sender at radiator outlet - G83-
- ☐ two-pin plug

20 - O-ring

- ☐ Replace after disassembly

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1.1.2 Summary of components - radiator with two radiator fans

1 - Top coolant hose

- ☐ To connection fitting at cylinder head

2 - O-ring

- ☐ Replace after disassembly

3 - Radiator

- ☐ removing and installing
⇒ [“1.10 Removing and installing radiator”, page 111](#)
- ☐ after replacing fill entire system with fresh coolant

4 - Gasket

5 - Screw cap

6 - Connector

7 - Screw

- ☐ 2 Nm

8 - Expansion reservoir

- ☐ Check the cooling system for tightness
⇒ [“1.11 Checking the coolant system for leak-tightness”, page 114](#)
- ☐ Test pressure
0.14...0.16 MPa (1.4 ... 1.6 bar) - overpressure

9 - Support

- ☐ for radiator

10 - Nut

- ☐ 5 Nm

11 - Support

12 - Fan shroud

- ☐ removing and installing
⇒ [“1.12 Removing and installing fan shroud and radiator fan V7 and V35”, page 117](#)

13 - Right radiator fan -V35-

14 - Radiator fan -V7-

- ☐ with radiator fan control unit -J293-

15 - Bottom coolant hose

- ☐ to the connection fitting for the coolant regulator

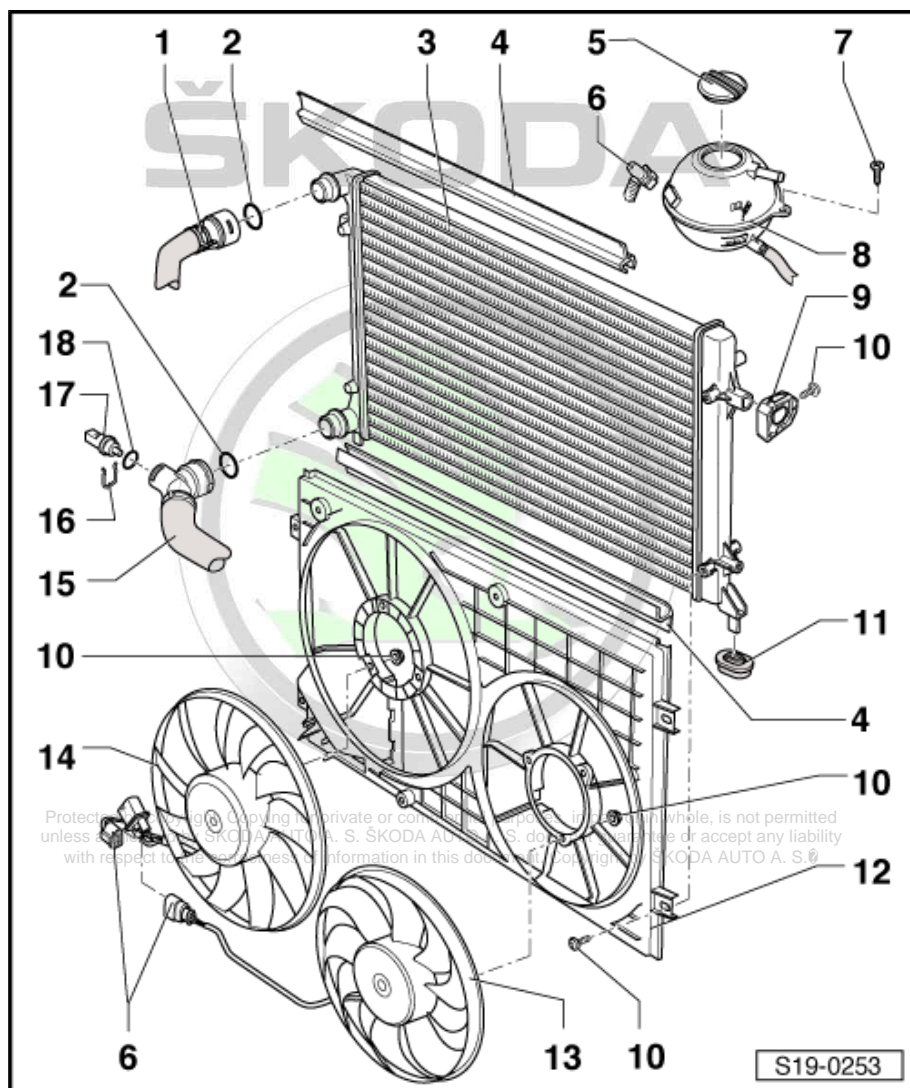
16 - Retaining clip

17 - Thermoswitch/senders

Depending upon vehicle equipment:

- ☐ Thermoswitch for radiator fan - F18-
- ☐ three-pin plug

switching temperatures:



- ☐ 1. Stage: 92 - 97 °C on; 84 °C off
- ☐ 2. Stage: 99 - 105 °C on; 91 °C off

or

- ☐ Coolant temperature sender at radiator outlet - G83-
- ☐ two-pin plug

18 - O-ring

- ☐ Replace after disassembly

1.2 Summary of components: Parts of cooling system engine side - Engines with identification characters BGU, BSE, BSF

1 - Throttle valve control unit - J338-

- ☐ warmed up through coolant

2 - Sealing ring

- ☐ Replace after disassembly

3 - to heat exchanger

- ☐ Connection diagram for coolant hoses
⇒ ["1.4 Connection diagram for coolant hoses - Engines with identification characters BGU, BSE, BSF", page 103](#)

4 - Connection fittings

5 - O-ring

- ☐ Replace after disassembly

6 - Coolant temperature sender - G62-

- ☐ for engine control unit
- ☐ before removing, reduce pressure in cooling system if necessary

7 - Retaining clip

8 - towards top radiator

9 - Screw

- ☐ 10 Nm

10 - Coolant pipe

11 - Screw

- ☐ 40 Nm

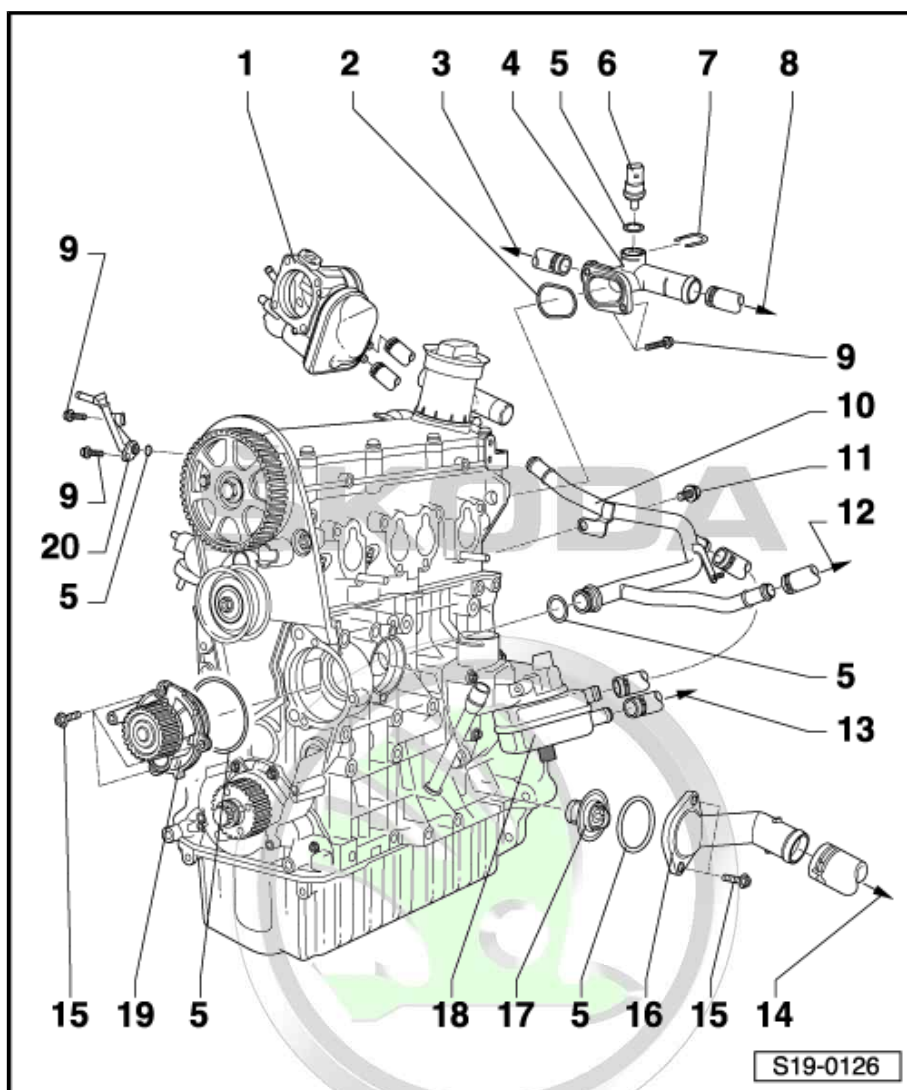
12 - Hose to the expansion reservoir

13 - to the coolant hose above

- ☐ is mounted in the engines with identification characters BGU

14 - Bottom coolant hose

- ☐ Connection diagram for coolant hoses
⇒ ["1.4 Connection diagram for coolant hoses - Engines with identification characters BGU, BSE, BSF", page 103](#)



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**15 -**

- ☐ 15 Nm

16 - Connection fittings

- ☐ disassembling and assembling ⇒ [“1.9 Removing and installing coolant regulator”, page 110](#)

17 - Thermostat

- ☐ removing and installing ⇒ [“1.9 Removing and installing coolant regulator”, page 110](#)
- ☐ test: Heat up regulator in a water bath
- ☐ Start of opening approx. 87 °C
- ☐ End of opening approx. 102 °C
- ☐ opening stroke at least 7 mm

18 - Engine oil cooler

- ☐ is mounted in the engines with identification characters BGU

19 - Coolant pump

- ☐ check smooth operation
- ☐ replace completely if damaged or leaking
- ☐ removing and installing ⇒ [“1.8 Removing and installing coolant pump”, page 108](#)

20 - Vent connection

- ☐ to coolant expansion reservoir

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1.3 Summary of components: Parts of cooling system engine side - Engines with identification characters CCSA, CHGA, CMXA

1 - Throttle valve control unit - J338-

- ☐ warmed up through coolant

2 - Sealing ring

- ☐ Replace after disassembly

3 - to heat exchanger

- ☐ Connection diagram for coolant hoses
⇒ ["1.4 Connection diagram for coolant hoses - Engines with identification characters BGU, BSE, BSF", page 103](#)

4 - Connection fittings

5 - O-ring

- ☐ Replace after disassembly

6 - Coolant temperature sender - G62-

- ☐ for engine control unit
- ☐ before removing, reduce pressure in cooling system if necessary

7 - Retaining clip

8 - towards top radiator

9 - Screw

- ☐ 10 Nm

10 - Coolant pipe

11 - Screw

- ☐ 40 Nm

12 - Hose to the expansion reservoir

13 - Sealing ring

- ☐ Replace after disassembly

14 - Heating element for engine preheating -Z97-

- ☐ is mounted in the engines with identification characters CCSA, CMXA
- ☐ removing and installing ⇒ ["2.1 Summary of components", page 119](#)

15 - Bottom coolant hose

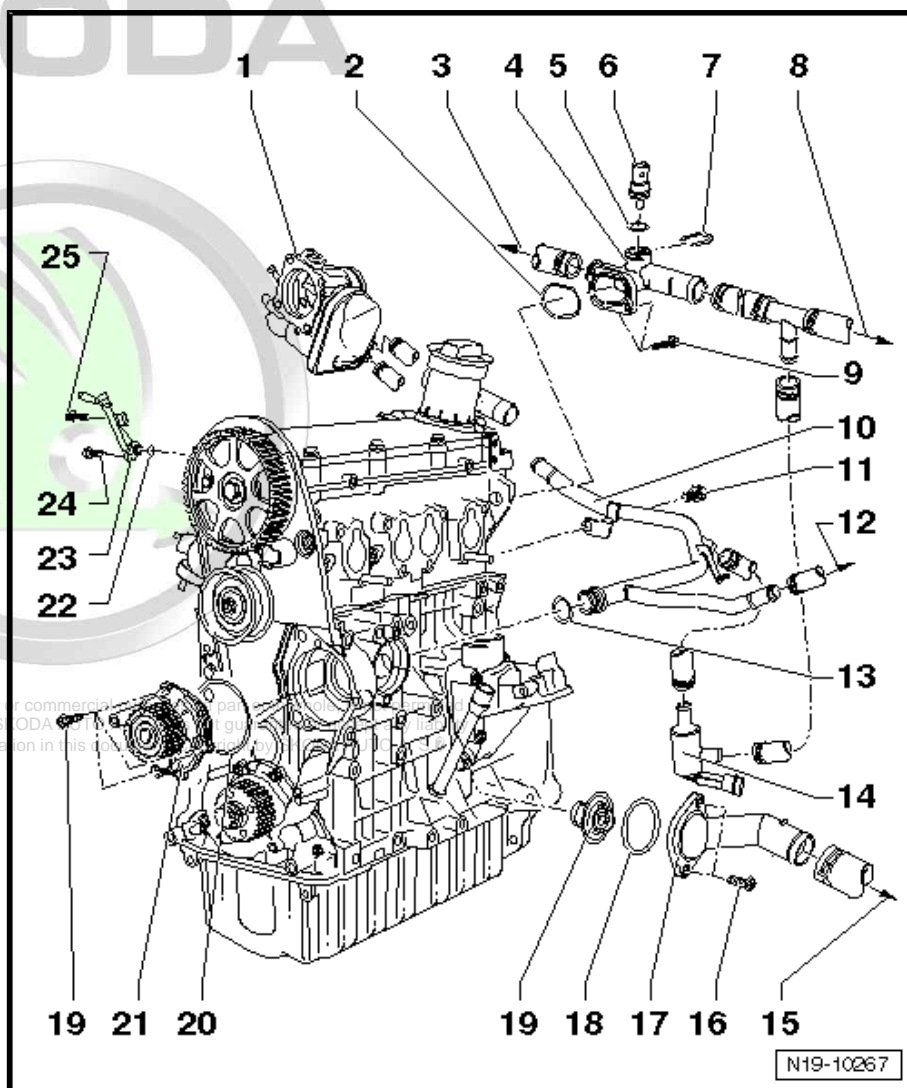
- ☐ Connection diagram for coolant hoses
⇒ ["1.4 Connection diagram for coolant hoses - Engines with identification characters BGU, BSE, BSF", page 103](#)

16 - Screw

- ☐ 15 Nm

17 - Connection fittings

- ☐ disassembling and assembling ⇒ ["1.9 Removing and installing coolant regulator", page 110](#)



**18 - O-ring**

- ☐ Replace after disassembly

19 - Thermostat

- ☐ removing and installing ⇒ [“1.9 Removing and installing coolant regulator”, page 110](#)
- ☐ test: Heat up regulator in a water bath
- ☐ Start of opening approx. 87 °C
- ☐ End of opening approx. 102 °C
- ☐ opening stroke at least 7 mm

20 - O-ring

- ☐ Replace after disassembly

21 - Coolant pump

- ☐ check smooth operation
- ☐ replace completely if damaged or leaking
- ☐ removing and installing ⇒ [“1.8 Removing and installing coolant pump”, page 108](#)

22 - O-ring

- ☐ Replace after disassembly

23 - Vent connection

- ☐ to coolant expansion reservoir

24 - Screw

- ☐ 10 Nm

25 - Screw

- ☐ 10 Nm

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1.4 Connection diagram for coolant hoses - Engines with identification characters BGU, BSE, BSF

1 - Radiator

- ☐ removing and installing
⇒ ["1.10 Removing and installing radiator", page 111](#)
- ☐ fill with fresh coolant after replacing

2 - Thermostat

- ☐ removing and installing
⇒ ["1.9 Removing and installing coolant regulator", page 110](#)
- ☐ test: Heat up regulator in a water bath
- ☐ Start of opening approx. 87 °C
- ☐ End of opening approx. 102 °C
- ☐ opening stroke at least 7 mm

3 - Coolant pump

- ☐ removing and installing
⇒ ["1.8 Removing and installing coolant pump", page 108](#)

4 - Cylinder head and cylinder block

- ☐ fill with fresh coolant after replacing

5 - Expansion reservoir

- ☐ Check the overpressure valve in the screw cap
⇒ ["1.11 Checking the coolant system for leak-tightness", page 114](#)

6 - Intake manifold with heating for throttle valve supports

7 - Heat exchanger

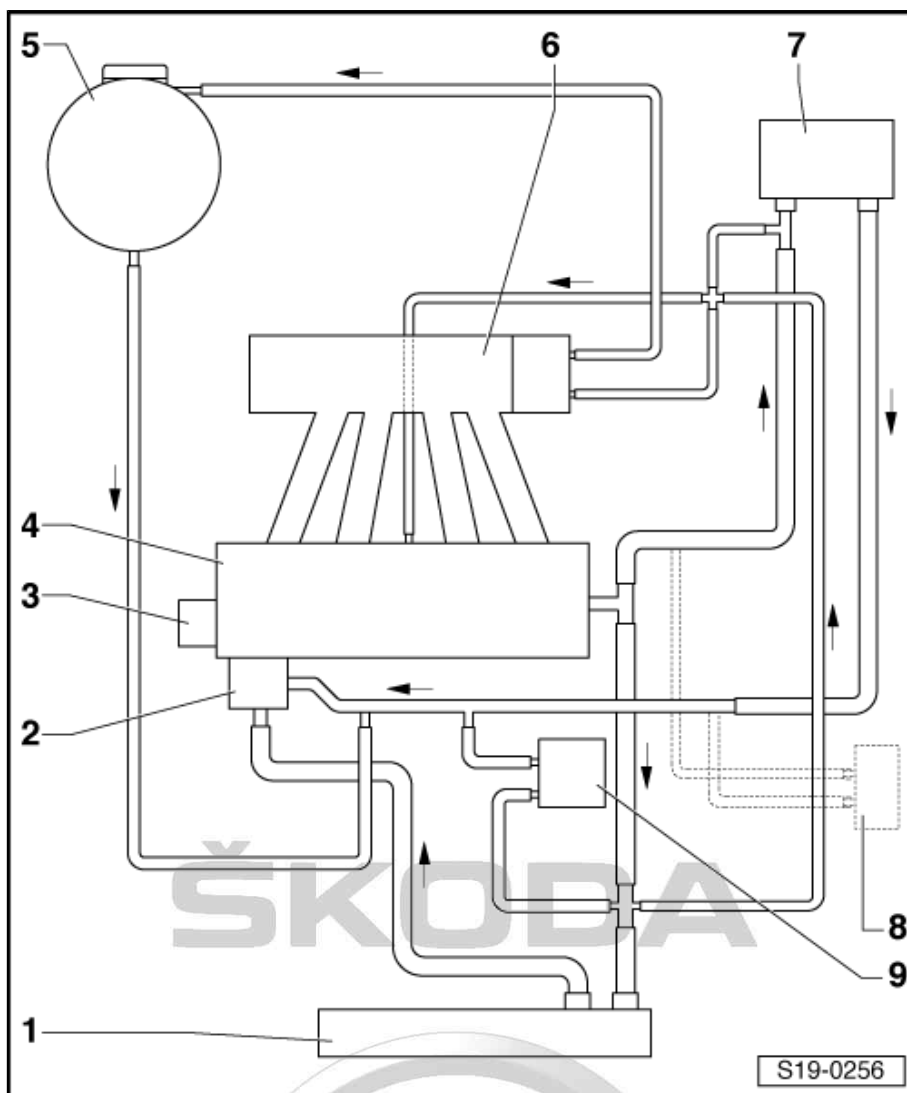
- ☐ fill with fresh coolant after replacing

8 - Gearbox oil cooler

- ☐ only on vehicles with automatic gearbox

9 - Engine oil cooler

- ☐ is mounted in the engines with identification characters BGU
- ☐ removing and installing ⇒ ["1 Removing and installing parts of the lubrication system", page 86](#)





1.5 Connection diagram for coolant hoses - Engines with identification characters CCSA, CHGA, CMXA

1 - Expansion reservoir

- ☐ Check the overpressure valve in the screw cap
⇒ ["1.11 Checking the coolant system for leak-tightness", page 114](#)

2 - Intake manifold with heating for throttle valve supports

3 - Heat exchanger

- ☐ fill with fresh coolant after replacing

4 - Evaporator

- ☐ is mounted in the engines with identification characters CHGA

5 - Heating element for engine preheating -Z97-

- ☐ is mounted in the engines with identification characters CCSA, CMXA
- ☐ removing and installing
⇒ ["2.1 Summary of components", page 119](#)

6 - Radiator

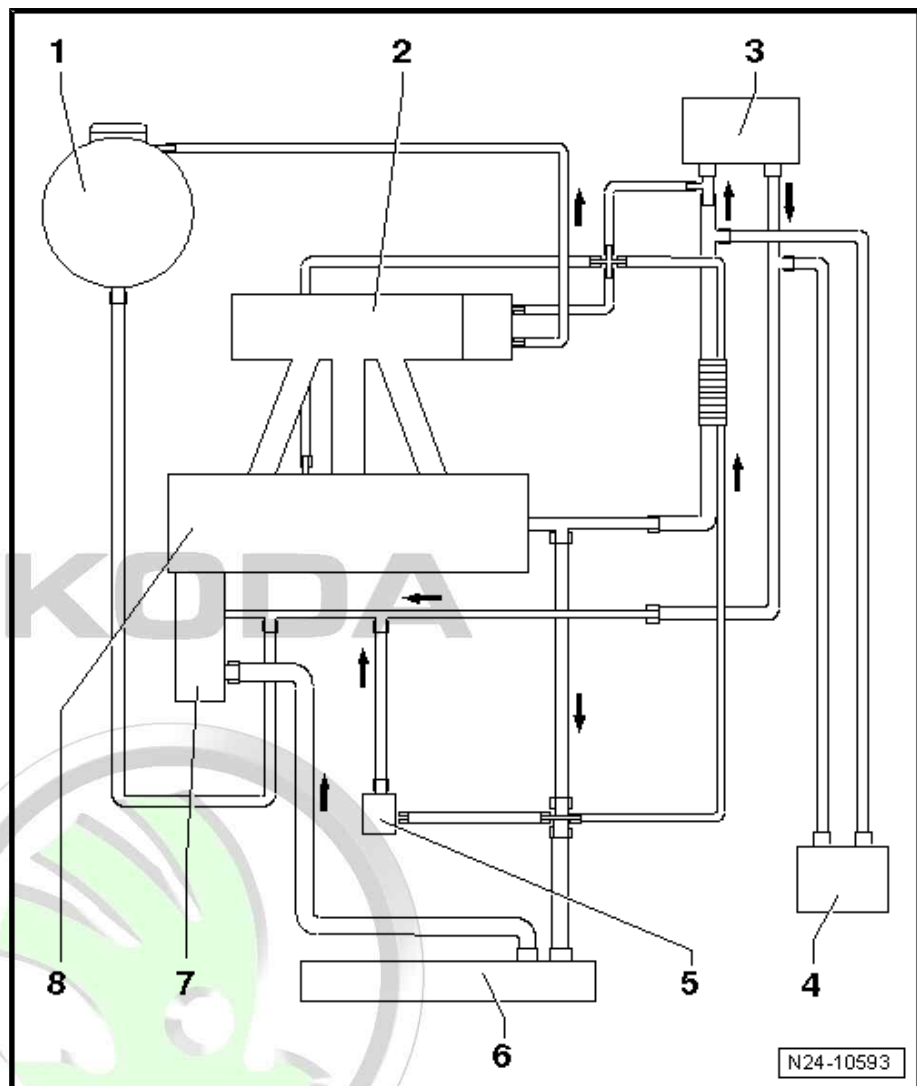
- ☐ removing and installing
⇒ ["1.10 Removing and installing radiator", page 111](#)
- ☐ fill with fresh coolant after replacing

7 - Thermostat

- ☐ removing and installing
⇒ ["1.9 Removing and installing coolant regulator", page 110](#)
- ☐ test: Heat up regulator in a water bath
- ☐ Start of opening approx. 87 °C
- ☐ End of opening approx. 102 °C
- ☐ opening stroke at least 7 mm

8 - Cylinder head and cylinder block

- ☐ fill with fresh coolant after replacing



1.6 Connection diagram for coolant hoses - vehicles with auxiliary heating

1 - Radiator

- ☐ removing and installing
⇒ ["1.10 Removing and installing radiator"](#), page 111
- ☐ fill with fresh coolant after replacing

2 - Thermostat

- ☐ removing and installing
⇒ ["1.9 Removing and installing coolant regulator"](#), page 110
- ☐ test: Heat up regulator in a water bath
- ☐ Start of opening approx. 87 °C
- ☐ End of opening approx. 102 °C
- ☐ opening stroke at least 7 mm

3 - Coolant pump

- ☐ removing and installing
⇒ ["1.8 Removing and installing coolant pump"](#), page 108

4 - Auxiliary heating

5 - Cylinder head and cylinder block

- ☐ fill with fresh coolant after replacing

6 - Intake manifold with heating for throttle valve supports

7 - Expansion reservoir

- ☐ Check the overpressure valve in the screw cap
⇒ ["1.11 Checking the coolant system for leaktightness"](#), page 114

8 - Non-return valve

- ☐ integrated into the coolant hose
- ☐ not always visible from the outside

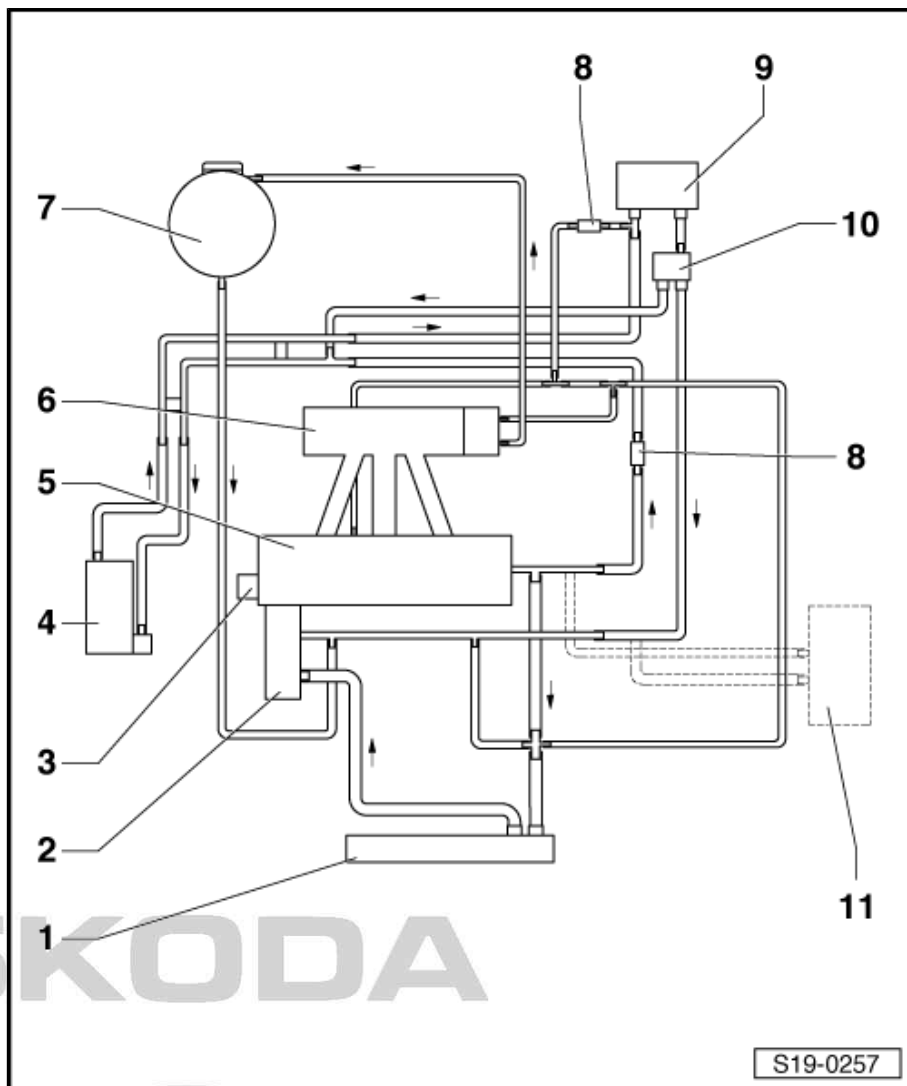
9 - Heat exchanger for heating

- ☐ fill with fresh coolant after replacing

10 - Coolant shut-off valve of heating system -N279-

11 - Gearbox oil cooler

- ☐ only on vehicles with automatic gearbox



1.7 Draining and filling up coolant

Special tools and workshop equipment required

- ◆ Adapter for cooling system testing device , e.g. -V.A.G 1274/8-
- ◆ Catch pan , e.g. -VAS 6208-



- ◆ Pliers for spring strap clamps
- ◆ Refractometer
- ◆ Protective goggles and gloves

Draining



Note

- ◆ *The drained coolant must not be re-used.*
- ◆ *Dispose of drained oil.*
- ◆ *Observe the disposal instructions.*



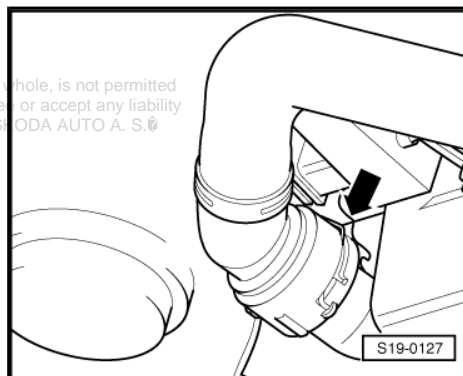
WARNING

Hot steam or hot coolant may escape when the compensation bottle is opened. Cover the cap with a cloth and open carefully.

- Open the cap of the coolant expansion reservoir.
- Remove the sound dampening system ⇒ Body Work; Rep. gr. 50 .
- Place a catch pan under the engine.
- Remove coolant hose at bottom of radiator -arrow-.

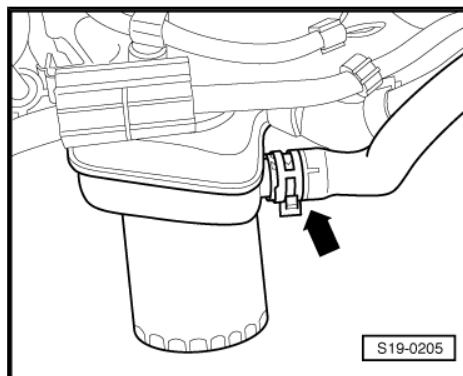
For engine with engine code BGU

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- In addition, remove coolant hose at bottom of engine oil cooler -arrow- and allow remaining coolant to drain.

For engine with identification characters CCSA, CMXA



- Remove coolant hose at the heating element for engine pre-heating -Z97- -arrow- and drain residual coolant.

Filling up



Note

- ◆ *The drained coolant must not be re-used.*
- ◆ *The cooling system is filled all year round with a mixture of distilled water and coolant additive with anti-corrosion agent.*

- Connect coolant hose at bottom of radiator.

For engine with engine code BGU

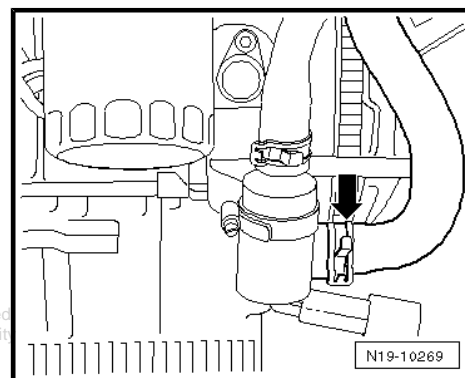
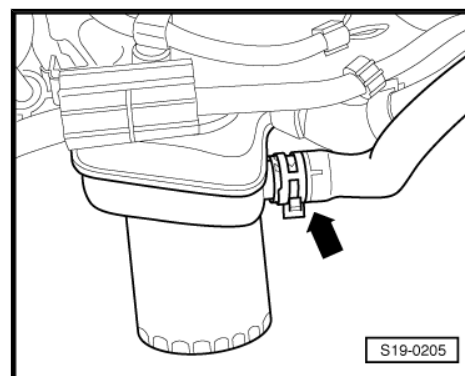
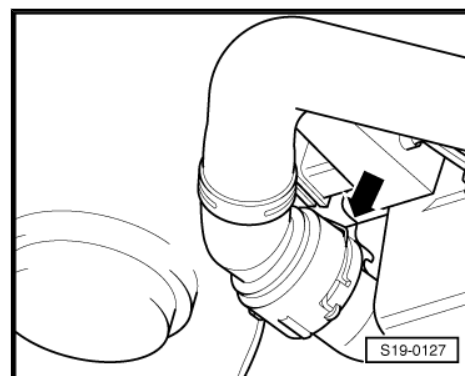
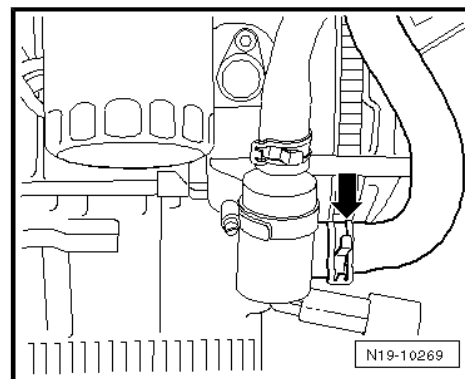
- Connect the coolant hose on the engine oil cooler -arrow-.

For engine with identification characters CCSA, CMXA

- Connect -arrow- coolant hose at heating element for engine preheating -Z97- .

Select the appropriate coolant additive from the ⇒ Electronic Catalogue of Original Parts or from the list of allowed coolant additives ⇒ Maintenance ; Booklet Octavia II .

- In a clean reservoir, mix distilled water and anti-freeze in the specified mixing ratio ⇒ Maintenance ; Booklet Octavia II .



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- Top up coolant through the neck of the expansion reservoir, until it reaches the max. marking of the coolant level.

Vehicles without auxiliary heating.

- Start engine, run for not more than 2 minutes at approx. 1500 rpm and while doing so top up coolant in the expansion reservoir.
- Tighten cap at expansion reservoir.
- Then run engine until radiator fan -V7- starts.

Vehicles with auxiliary heating.



Caution

The auxiliary heating must only be switched on, if the refrigerant circuit is filled up -as described below-.

- Connect diagnostic unit -VAS 5051- .
- Start the engine and maintain the engine revolutions for about 3 minutes at about 2000 r.p.m.
- On the display press consecutively the buttons for “Vehicle self-diagnosis”, “18 - Auxiliary heating system” and “03 - Actuator diagnosis”.
- Press the right arrow on the display so often until the coolant shut-off valve of heating system - N279- is shown.
- Perform self-diagnosis of the coolant shut-off valve of heating system -N279- and maintain the engine speed at approx. 2000 rpm for about 1 minute.

For all vehicles

- Check coolant level when the expansion reservoir is closed.
- When engine is at operating temperature the coolant level must be at the maximum marking, when engine is cold it must be between the minimum and the maximum markings.



WARNING

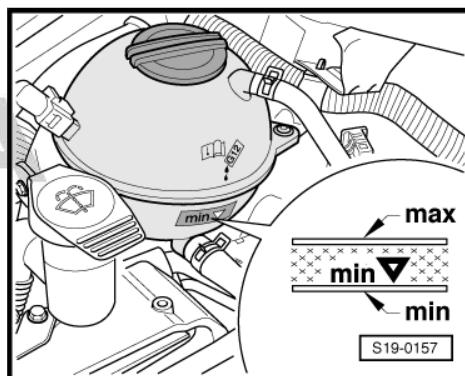
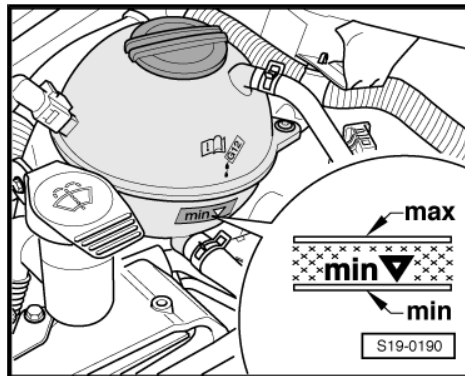
Hot steam may escape when the coolant expansion reservoir is opened. Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding. Cover the cap with a cloth and open carefully.

- If necessary, top up with coolant.

1.8 Removing and installing coolant pump

Special tools and workshop equipment required

- ◆ Wire
- ◆ Locking agent - D 000 600 A2-





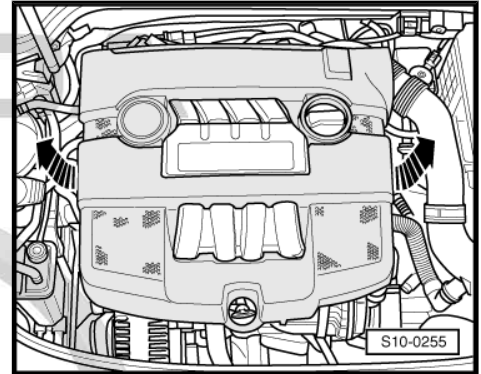
Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8.

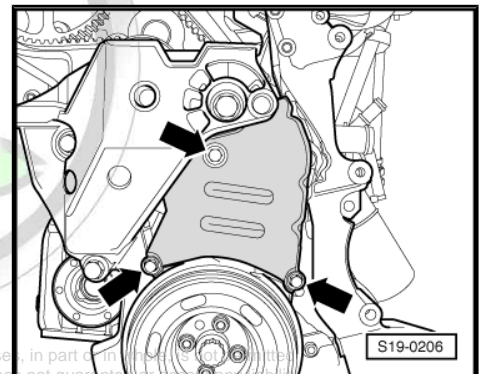
Removing

- If present, remove engine cover -arrows-.
- Drain coolant
⇒ "1.7 Draining and filling up coolant", page 105.
- Remove V-ribbed belt
⇒ "1.2 Removing and installing V-ribbed belt", page 34.
- Remove ribbed V-belt tensioning device
⇒ "1.1 Assembly overview - V-ribbed belt", page 32.
- Take toothed belt off camshaft sprocket
⇒ "1.4 Removing and installing toothed belt", page 36.
- Remove middle toothed belt guard -arrows-.



Note

- ◆ The belt pulley and the bottom toothed belt guard can remain installed.
- ◆ The timing belt remains fitted onto the crankshaft timing belt sprocket.
- ◆ Cover the toothed belt with a cloth before removing the coolant pump to protect it from the coolant.



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- Unscrew fixing bolts -1- of the coolant pump and remove the coolant pump -2-.
- Remove O-ring -3-.



Note

Replace O-ring.

- Clean sealing surface for O-ring or smoothen.

Install

Installation is performed in the reverse order, pay attention to the following points:



Note

Insert screws for middle toothed belt guard with locking agent -D 000 600 A2- .

- Moisten new O-ring -3- with coolant.
- Attach the coolant pump -2-.
- Fitting position: Plug in the housing is pointing downwards.
- Tighten the screws -1- of the coolant pump.

Tightening torque: 15 Nm

- install (set the timing)
⇒ [“1.4 Removing and installing toothed belt”, page 36](#) .
- Install the V-ribbed belt
⇒ [“1.2 Removing and installing V-ribbed belt”, page 34](#) .
- Top up coolant
⇒ [“1.7 Draining and filling up coolant”, page 105](#) .

1.9 Removing and installing coolant regulator

Special tools and workshop equipment required

- ♦ Catch pan , e.g. -VAS 6208-
- ♦ Pliers for spring strap clamps



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#) .

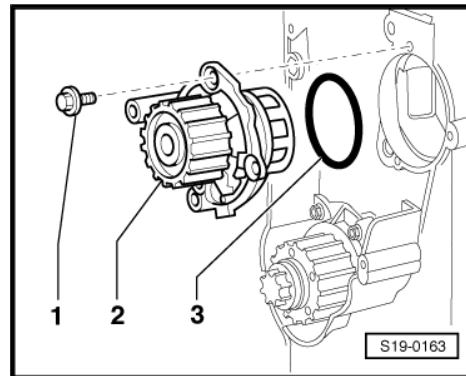
Removing

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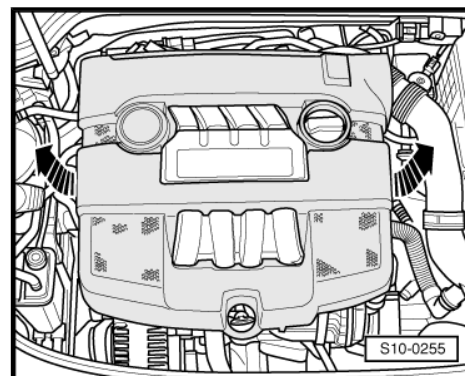
WARNING

Observe measures when disconnecting the battery ⇒ *Electrical System; Rep. gr. 27* .

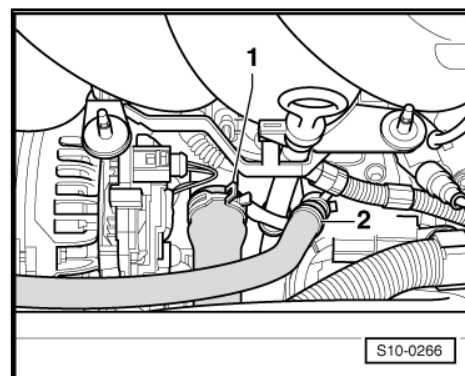


- Disconnect the battery-earth strap with the ignition off.

- If present, remove engine cover -arrows-.
- Drain coolant
⇒ [“1.7 Draining and filling up coolant”, page 105](#) .



- Detach coolant hoses -1- and -2-.



- Unscrew bolts -4-, take off connection fitting -3-, O-ring -2- and thermostat -1-.

Install

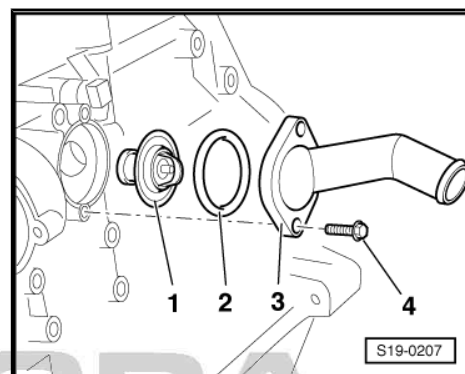
Installation is performed in the reverse order, pay attention to the following points:



Note

Replace O-ring.

- Clean sealing surface for O-ring or smoothen.
- Insert coolant thermostat.
- Fitting position: The clamp of the coolant thermostat must be positioned vertically.
- Moisten new O-ring with coolant.
- Connect battery ⇒ Electrical System; Rep. gr. 27 .
- Top up coolant
⇒ [“1.7 Draining and filling up coolant”, page 105](#) .



1.10 Removing and installing radiator

Special tools and workshop equipment required

- ◆ Catch pan , e.g. -VAS 6208-
- ◆ Pliers for spring strap clamps



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#) .

Removing



WARNING

Hot steam or hot coolant may escape when the compensation bottle is opened. Cover the cap with a cloth and open carefully.

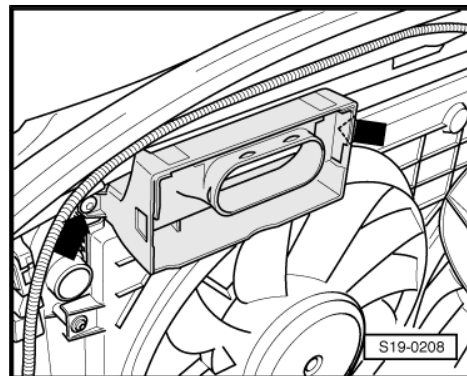
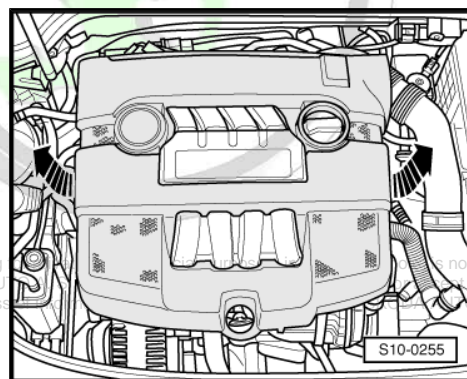
- If present, remove engine cover -arrows-.
- Drain coolant
⇒ [“1.7 Draining and filling up coolant”, page 105](#) .
- Pull off intake air duct at the bottom of the container with pre-cubic contents.

Vehicles with air conditioning

- Remove front bumper ⇒ Body Work; Rep. gr. 63

Continued for all vehicles

- Remove air filter housing
⇒ [“1.4 Air filter with component parts - Summary of components”, page 177](#) .
- Pull off intake air duct to container with pre-cubic contents from lock carrier.
- Unscrew air guide at lock carrier -arrows-.



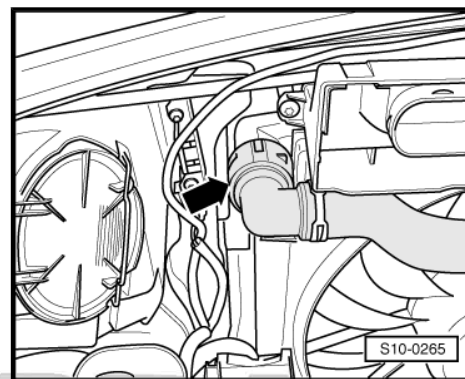
- Detach top coolant hose from the radiator -arrow-.
- Remove fan shroud for radiator fan - V7- and -V35-
⇒ [“1.12 Removing and installing fan shroud and radiator fan V7 and V35”, page 117](#) .
- Unscrew the air guides on the left and right of the radiator.

Vehicles without air conditioning



Note

For the following work, a second mechanic is required to hold the radiator.



- Unscrew fixing screws for radiator mounting left and right Pos. -10-.
- ◆ ⇒ [“1.1.1 Summary of components - radiator with a radiator fan”, page 96](#) .
- ◆ ⇒ [“1.1.2 Summary of components - radiator with two radiator fans”, page 98](#) .
- Unhook the radiator out of the lower bearings and remove it downwards.

Vehicles with air conditioning



WARNING

Do not open the refrigerant circuit of the air conditioning system.



Note

- ◆ *In order to avoid damage to the condenser as well as to the refrigerant lines and hoses, ensure that the lines and hoses are not over-tensioned, kinked or bent.*
- ◆ *For the following work, a second mechanic is required to hold the radiator.*
- Unscrew fixing screws for radiator mounting left and right Pos. -10-.
- ◆ ⇒ [“1.1.1 Summary of components - radiator with a radiator fan”, page 96](#) .
- ◆ ⇒ [“1.1.2 Summary of components - radiator with two radiator fans”, page 98](#) .

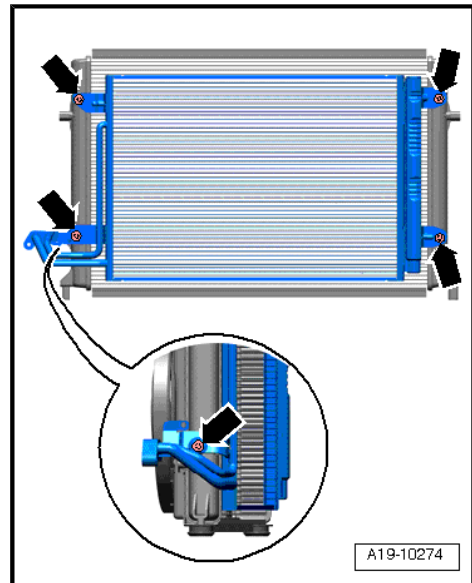


- Release the securing bolts -arrows- of the condenser.
- Swivel the radiator slightly backwards.
- Unhook the radiator out of the lower bearings and remove it downwards.

Install

Installation is performed in the reverse order, pay attention to the following points:

- Install front bumper ⇒ Body Work; Rep. gr. 63 .
- Top up coolant
⇒ [“1.7 Draining and filling up coolant”, page 105](#) .



1.11 Checking the coolant system for leak-tightness

⇒ [“1.11.1 Inspecting coolant system with cooling system testing device V.A.G 1274 for tightness”, page 114](#)

⇒ [“1.11.2 Inspecting coolant system with cooling system testing device V.A.G 1274 B for tightness”, page 115](#)

1.11.1 Inspecting coolant system with cooling system testing device - V.A.G 1274- for tightness

Special tools and workshop equipment required

- ♦ Cooling system testing device , e.g. -V.A.G 1274-
- ♦ Adapter for cooling system testing device , e.g. -V.A.G 1274/8-
- ♦ Adapter for cooling system testing device , e.g. -V.A.G 1274/9-



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#) .

Test condition

- Engine must be warm.



WARNING

Hot steam may escape when the compensation bottle is opened.

- ♦ *Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding.*
- ♦ *Cover the cap with a cloth and open carefully.*

- Open compensation bottle.

- Position the cooling system testing device - V.A.G 1274- with adapter - V.A.G 1274/8- on the coolant expansion reservoir.
- Using the hand pump of the testing device generate an overpressure of approx. 0.15 MPa (1.5 bar).
- The pressure must not drop below 0.02 MPa (0.2 bar) after 10 minutes.

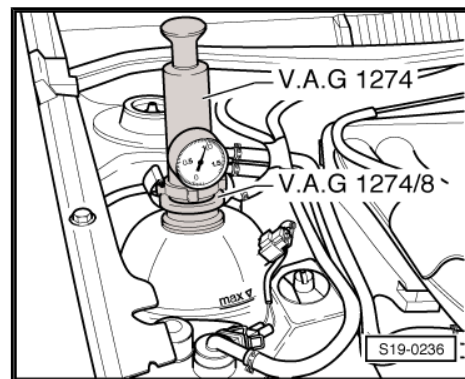
If the pressure falls below 0.02 MPa (0.2 bar):

- Search position of the leak and repair fault.



Note

- ◆ A fall in pressure of 0.02 MPa (0.2 bar) within 10 minutes is caused by cooling of the coolant.
- ◆ The colder the engine, the lower the pressure loss.



Testing the pressure relief valve in the cap

- Screw the screw cap into the adapter for cooling system testing device - V.A.G 1274/9- .
- Build up overpressure using hand pump on cooling system testing device - V.A.G 1274- .

Blue filler cap:

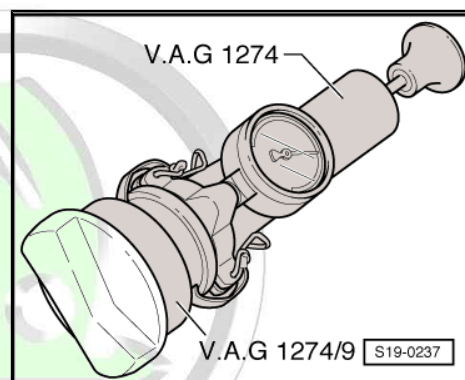
- ◆ The pressure relief valve must open at 0.14... 0.16 MPa (1.4 ... 1.6 bar) overpressure.

Black filler cap:

- ◆ The pressure relief valve must open at 0.16... 0.18 MPa (1.6 ... 1.8 bar) overpressure.

If the pressure relief valve opens too early or too late:

- Replace cap.



1.11.2 Inspecting coolant system with cooling system testing device - V.A.G 1274 B- for tightness

Special tools and workshop equipment required

- ◆ Cooling system testing device , e.g. -V.A.G 1274 B-
- ◆ Adapter for cooling system testing device , e.g. -V.A.G 1274/8-
- ◆ Adapter for cooling system testing device , e.g. -V.A.G 1274/9-



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8 .

Test condition

- Engine must be warm.



WARNING

Hot steam may escape when the compensation bottle is opened.

- ◆ *Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding.*
- ◆ *Cover the cap with a cloth and open carefully.*

- Open compensation bottle.
- Screw the adapter for cooling system testing device - V.A.G 1274/8- into the coolant expansion bottle.
- Clamp the connecting piece - V.A.G 1274 B/1- in the adapter for cooling system testing device - V.A.G 1274/8- .
- Connect the connecting piece - V.A.G 1274 B/1- via the delivered connecting hose to the cooling system testing device - V.A.G 1274 B- .
- Build up a pressure of approximately 0.15 MPa (1.5 bar) using hand pump on cooling system testing device - V.A.G 1274 B- .
- The pressure must not drop below 0.02 MPa (0.2 bar) after 10 minutes.

If the pressure falls below 0.02 MPa (0.2 bar):

- Search position of the leak and repair fault.



Note

- ◆ *A fall in pressure of 0.02 MPa (0.2 bar) within 10 minutes is caused by cooling of the coolant.*
- ◆ *The colder the engine, the lower the pressure loss.*

Testing the pressure relief valve in the cap

- Screw the screw cap into the adapter for cooling system testing device - V.A.G 1274/9- .
- Build up overpressure using hand pump on cooling system testing device - V.A.G 1274 B- .

Blue filler cap:

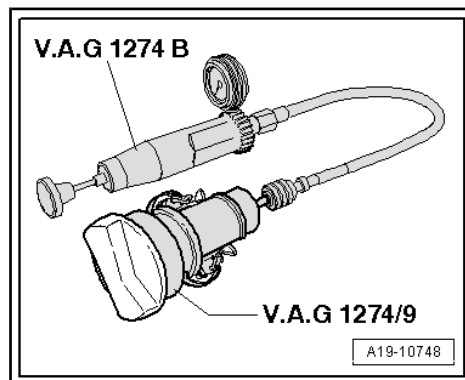
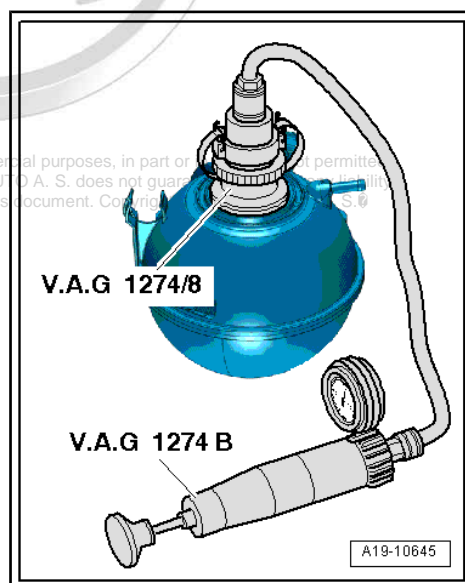
- ◆ The pressure relief valve must open at 0.14... 0.16 MPa (1.4 ... 1.6 bar) overpressure.

Black filler cap:

- ◆ The pressure relief valve must open at 0.16... 0.18 MPa (1.6 ... 1.8 bar) overpressure.

If the pressure relief valve opens too early or too late:

- Replace cap.



1.12 Removing and installing fan shroud and radiator fan - V7- and -V35-

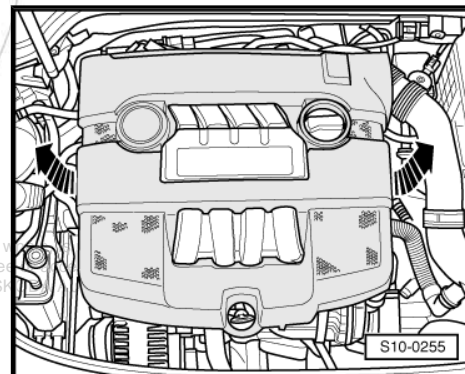


Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8.

Removing

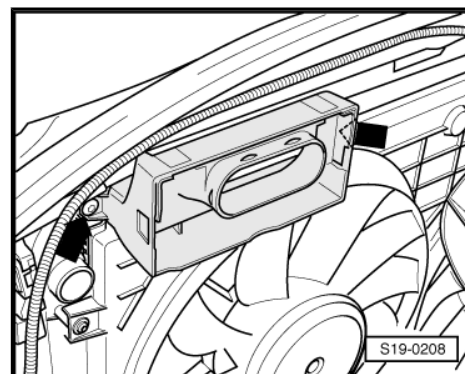
- If present, remove engine cover -arrows-.
- Pull off intake air duct to container with pre-cubic contents from lock carrier.



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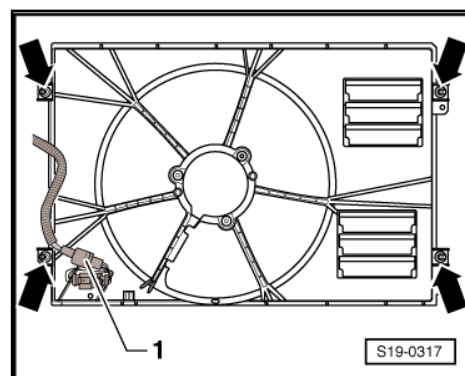
- Unscrew air guide at lock carrier -arrows-.

For vehicles with a radiator fan



- Separate electrical plug connection -1-.
- Screw out screws -arrows- and take out fan shroud downwards.

For vehicles with two radiator fans

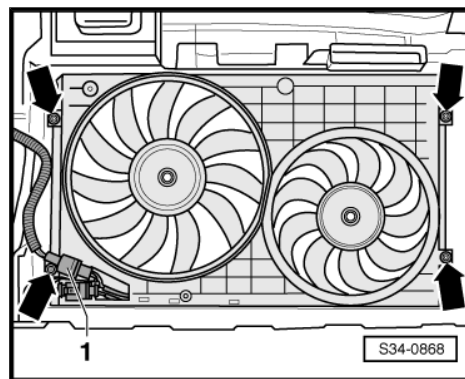




- Separate electrical plug connection -1-.
- Screw out screws -arrows- and take out fan shroud downwards.

Install

Installation is carried out in the reverse order.



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2 Heating element for engine preheating -Z97-

⇒ ["2.1 Summary of components", page 119](#)

2.1 Summary of components



Note

The heating element for engine preheating -Z97- is mounted in vehicles with the engine identification characters CCSA, CMXA.

1 - Heating element for engine preheating -Z97-

2 - Support

3 - Nut

□ 40 Nm

4 - Mounting clamp

5 - to coolant pipe

□ Position -10-

⇒ ["1.3 Summary of components: Parts of cooling system engine side - Engines with identification characters CCSA, CHGA, CMXA", page 101](#)

6 - Connecting clamp - 220 V

7 - Cable strap

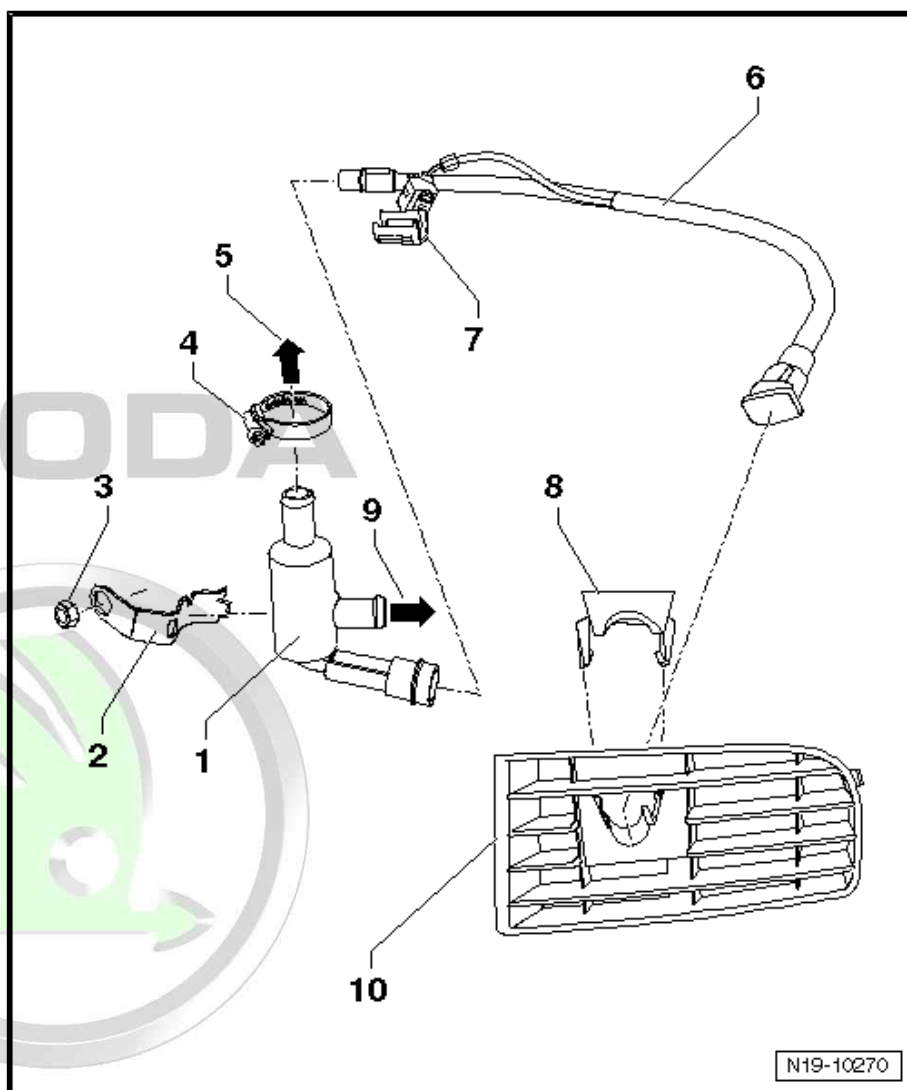
8 - Support

9 - to connection fitting

□ Position -10-

⇒ ["1.3 Summary of components: Parts of cooling system engine side - Engines with identification characters CCSA, CHGA, CMXA", page 101](#)

10 - Air guide - left



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20 – Fuel supply system

1 Removing and installing parts of the fuel supply system

⇒ [“1.1 Summary of components - fuel tank with attached parts”, page 120](#)

⇒ [“1.2 Extract fuel from the fuel tank”, page 122](#)

⇒ [“1.3 Removing and installing fuel delivery unit”, page 124](#)

⇒ [“1.4 Removing and installing the fuel gauge sender G”, page 126](#)

⇒ [“1.5 Removing and installing the fuel tank”, page 127](#)

⇒ [“1.5 Removing and installing the fuel tank”, page 127](#)

⇒ [“1.7 Removing and installing fuel filter”, page 130](#)

⇒ [“1.8 Testing fuel pump”, page 131](#)

⇒ [“1.9 Venting air from the fuel system”, page 139](#)

1.1 Summary of components - fuel tank with attached parts



Note

- ◆ *Fuel hoses at the engine must only be secured with spring-type clips. The use of clamp-type or screw-type clips is not allowed.*
- ◆ *Use pliers for spring strap clips to fit the spring strap clips.*
- ◆ *Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)*
⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#).
- ◆ *Observe safety measures and rules of cleanliness when working on the fuel supply*
⇒ [“2.3 Safety precautions and rules for cleanliness when working on petrol fuel supply system”, page 10](#).

1 - Mounting part

2 - Screw cap

- ☐ Replace seal if damaged

3 - Earth connection

- ☐ check for firm seating

4 - Screw

- ☐ 11 Nm

5 - Support

6 - Fuel tank

- ☐ when removing support with the engine/gearbox jack, e.g. -V.A.G 1383 A -
- ☐ removing and installing ⇒ [“1.5 Removing and installing the fuel tank”, page 127](#)

7 - Screw

- ☐ Replace after disassembly
- ☐ 20 Nm

8 - Circlip

9 - Tensioning strap

- ☐ Check fitting position

10 - Heat shield

11 - Fuel filter with fuel pressure regulator

- ☐ Fitting position: arrow points in direction of flow
- ☐ Summary of components ⇒ [“1.6 Summary of components - fuel filter”, page 129](#)
- ☐ removing and installing ⇒ [“1.7 Removing and installing fuel filter”, page 130](#)

12 - Feed line

- ☐ to fuel rail
- ☐ check for firm seating

13 - Vent line

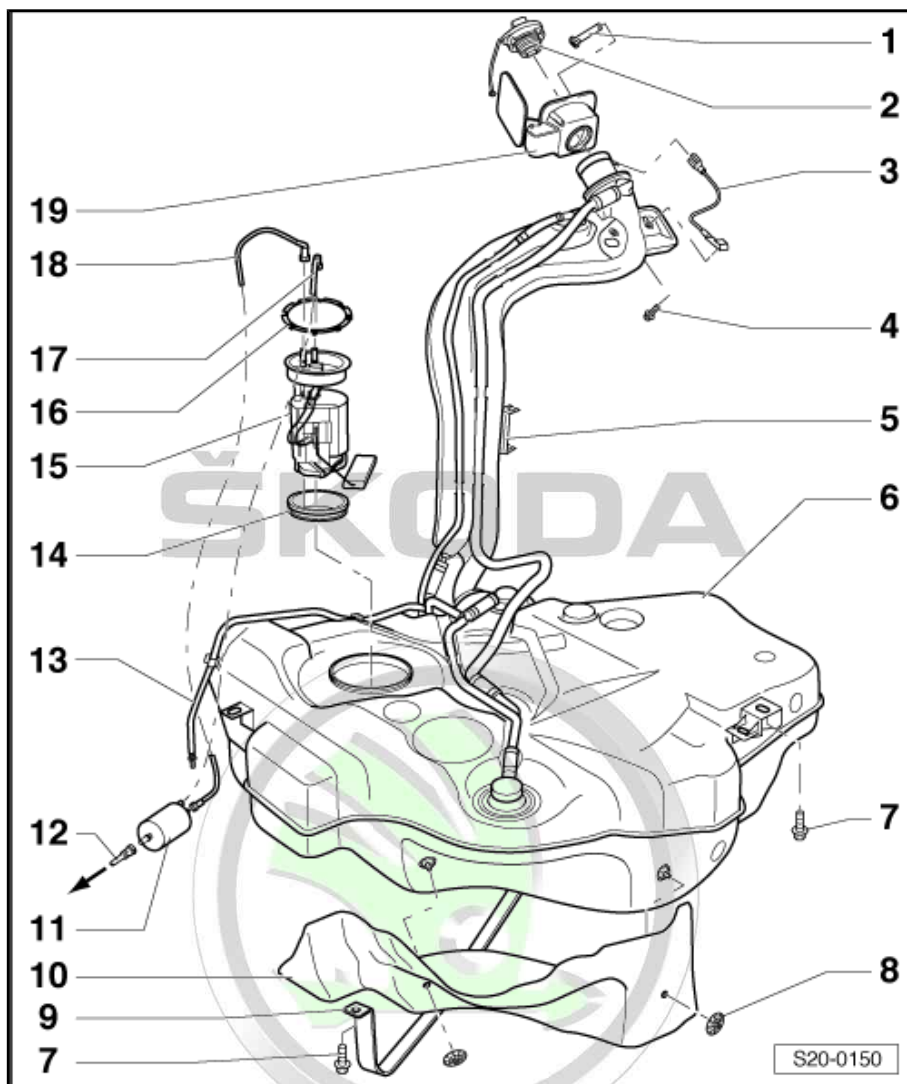
- ☐ clipped in place on the side of the fuel tank
- ☐ check for firm seating

14 - Sealing ring

- ☐ Replace after disassembly
- ☐ moisten the fuel delivery unit with fuel before installing the flange

15 - Fuel pump

- ☐ removing and installing ⇒ [“1.3 Removing and installing fuel delivery unit”, page 124](#)
- ☐ Check fuel delivery unit ⇒ [“1.8 Testing fuel pump”, page 131](#)
- ☐ Fitting position of flange of fuel delivery unit up to 05.10
⇒ [Fig. “Fitting position of flange of fuel delivery unit up to 05.10””, page 122](#)
- ☐ Fitting position of flange of fuel delivery unit as of 06.10
⇒ [Fig. “Fitting position of fuel delivery unit as of 06.10””, page 122](#)
- ☐ with sender -G- for fuel gauge



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- ☐ removing and installing the sender for fuel gauge
⇒ "1.4 Removing and installing the fuel gauge sender G", page 126
- ☐ Clean strainer if dirty

16 - Lock ring

- ☐ check for firm seating
- ☐ use wrench -T30101 (3087)- for removing and installing
- ☐ 110 Nm

17 - Feed line

- ☐ black
- ☐ clipped in place on the side of the fuel tank
- ☐ check for firm seating

18 - Return-flow line

- ☐ blue
- ☐ clipped in place on the side of the fuel tank
- ☐ check for firm seating

19 - Fuel tank lid unit

- ☐ with rubber bowl
- ☐ Removing and installing ⇒ Body Work; Rep. gr. 55

Fitting position of flange of fuel delivery unit up to 05.10

The marking -3- on the flange points against the direction of travel.

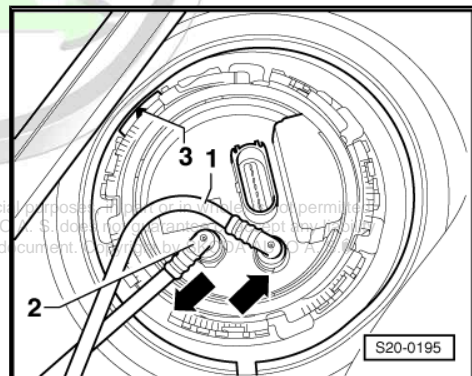


Note

The flange of the fuel delivery unit can only be installed in this position.

Blue or blue marked return-flow line -1-.

Black feed line -2-.



Note

After installing the flange of the fuel delivery unit, check whether the feed, return-flow and vent lines are clipped in place on the fuel tank.

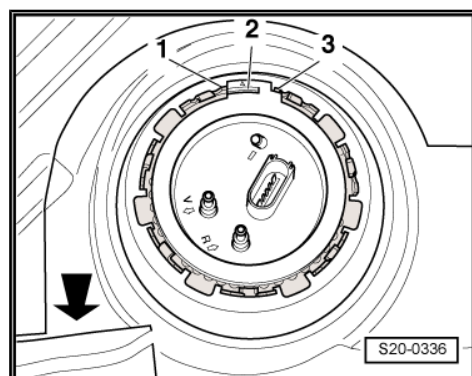
Fitting position of fuel delivery unit as of 06.10

The peg -2- on the fuel delivery unit must be between the pegs -1- and -3-.



Note

- ◆ The -arrow- shows the direction of travel.
- ◆ The fuel delivery unit can only be installed in this position.



1.2 Extract fuel from the fuel tank

Special tools and workshop equipment required

- ◆ Hose adapter , e.g. -V.A.G 1318-16 -
- ◆ Adapter , e.g. -V.A.G 1318-17-
- ◆ Measuring tool set , e.g. -V.A.G 1594 C-
- ◆ Fuel tank
- ◆ Battery



Note

- ◆ *If there are functional problems of the fuel delivery unit suction off fuel with fuel extraction device e.g. -VAS 5190- .*
- ◆ *Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)*
⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8 .
- ◆ *Observe safety measures and rules of cleanliness when working on the fuel supply*
⇒ "2.3 Safety precautions and rules for cleanliness when working on petrol fuel supply system", page 10 .
- Switch off all electrical components and withdraw key from ignition lock.
- Removing rear seat bench ⇒ Body Work; Rep. gr. 72 .
- Remove the cover from the fuel delivery unit.

Vehicles with auxiliary heating.

- Disconnect the plug connection of the dosing pump -V54- .

Continued for all vehicles



WARNING

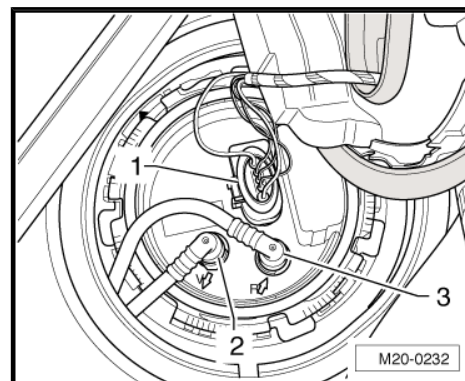
The fuel feed line is pressurized! Wear safety goggles and safety clothing, in order to avoid injuries and skin contact. Place cleaning cloths around the connection point before detaching cable connections. Reduce pressure by carefully removing the wiring.

- Unplug the 5-pin connector -1- and the black feed line -2-.



Note

Always press in the securing ring in order to unlock the lines.





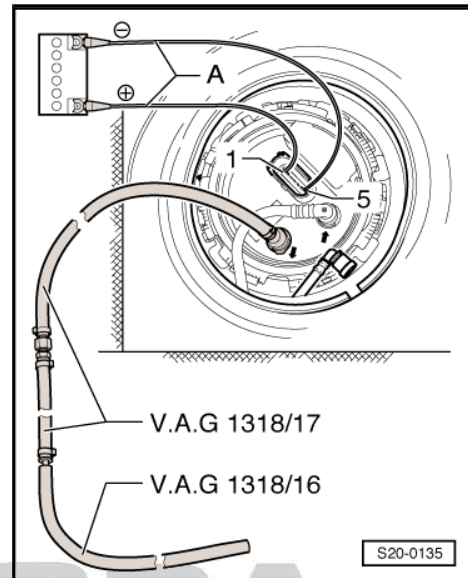
- Connect adapters -V.A.G 1318/16- and -V.A.G 1318/17- and fit this “drain pipe” onto the feed support of the fuel delivery unit.
- Hold the “drain pipe” in a suitable catch pan for fuel.
- Using auxiliary cables -A- from the measuring tool set -V.A.G 1594/C- connect up the battery through contacts of the fuel pump as follows:
Battery positive terminal (+) to contact -1- of the fuel pump.
Battery negative terminal (-) to contact -5- of fuel pump.

The fuel pump runs and suctions off fuel.



WARNING

In order to avoid fuel overflow due to the fuel tank not being sufficiently large enough, the fuel pump must not run unattended.



1.3 Removing and installing fuel delivery unit

Special tools and workshop equipment required

- ◆ Wrench for union nut - T30101 (3087)-
- ◆ Fuel extraction device - VAS 5190-



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ “2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)”, page 8.

Condition

- The fuel tank must not be more than $\frac{1}{2}$ full.



Note

- ◆ *If necessary drain the fuel tank*
⇒ “1.2 Extract fuel from the fuel tank”, page 122.
- ◆ *Observe safety measures and rules of cleanliness when working on the fuel supply*
⇒ “2.3 Safety precautions and rules for cleanliness when working on petrol fuel supply system”, page 10.

Removing

- Switch off all electrical components and withdraw key from ignition lock.
- Removing rear seat bench ⇒ Body Work; Rep. gr. 72.
- Remove the cover from the fuel delivery unit.
- For vehicles with auxiliary heating, the plug connection for the dosing pump -V54- must also be separated.



WARNING

The fuel feed line is pressurized! Place cleaning cloths around the connection point before detaching hose connections. Reduce pressure by carefully removing the hose.

- Detach the plug and the fuel lines -1 and 2- from the flange of the fuel delivery unit.



Note

- ◆ Press in the securing ring in order to unlock the fuel lines.
- ◆ For vehicles with auxiliary heating the plug connection for the dosing pump -V54- must be pulled out additionally (open lower clamp).

- Open lock ring with wrench for union nut -T30101 (3087)- .
- Pull the fuel delivery unit and the gasket ring out of the opening of the fuel tank.



Note

If fuel pump is to be renewed, old fuel pump must be drained before disposal.

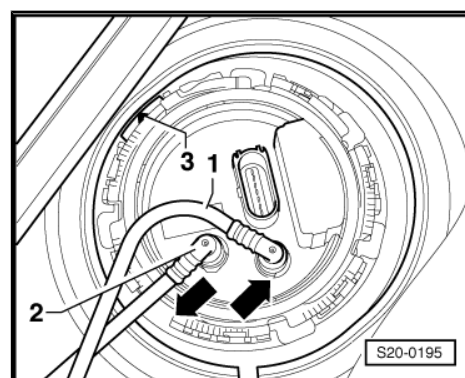
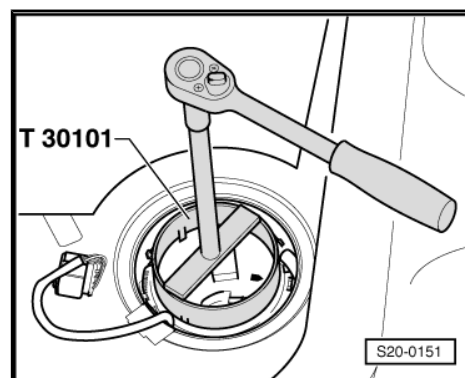
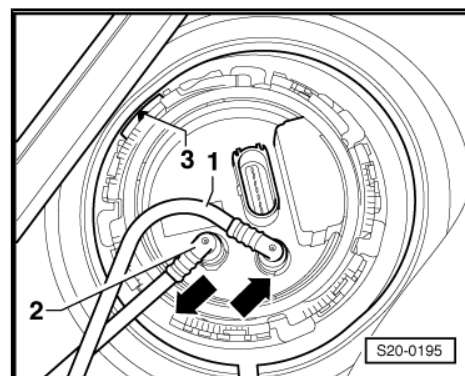
Install

The fuel delivery unit is installed in the reverse order. Pay attention to the following:



Note

- ◆ When inserting the fuel delivery unit, ensure that the fuel gauge sender is not bent.
- ◆ Insert dry gasket ring of the fuel delivery unit into the opening of the fuel tank.
- ◆ Only moisten gasket ring with fuel before assembly of the fuel delivery unit.
- ◆ Observe installation position of the fuel delivery unit flange: The marking on the flange -3- points against the direction of travel. The flange of the fuel delivery unit can only be installed in this position.
- ◆ Do not interchange the feed line -2- and return-flow line -1-.
- ◆ Make sure the line connections fit tightly.
- ◆ After installing the fuel delivery unit, check whether the feed, return-flow and vent lines are still clipped in place on the fuel tank.
- ◆ Pay attention to the required measures after connecting the battery ➔ Electrical System; Rep. gr. 27 .



1.4 Removing and installing the fuel gauge sender -G-

⇒ "1.4.1 Fuel gauge sender G type one", page 126

⇒ "1.4.2 Fuel gauge sender G type two", page 126

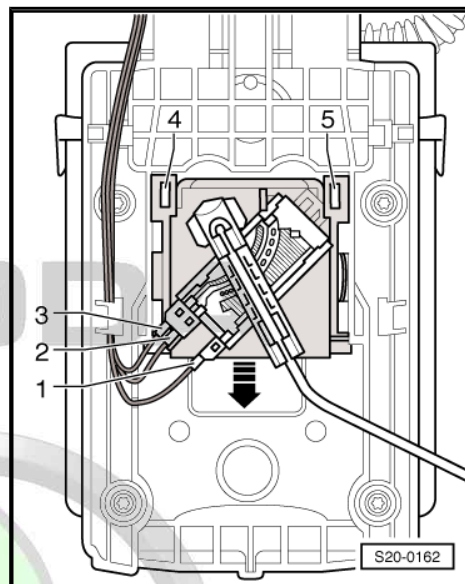
1.4.1 Fuel gauge sender -G- type one

Removing

- Remove fuel delivery unit
⇒ "1.3 Removing and installing fuel delivery unit", page 124 .
- Unlock and disconnect the cables -1- 3-.
- Raise securing tabs -4- and -5- with a screwdriver and detach the sender for fuel gauge display -G- towards the bottom -arrow-.

Install

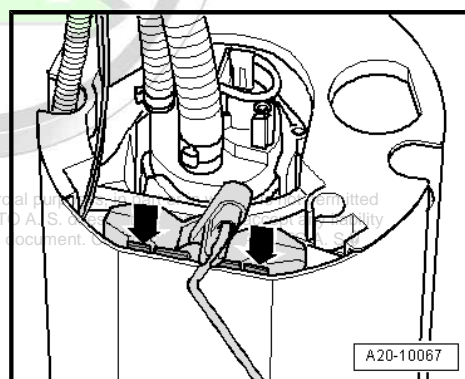
- Insert the fuel gauge sender -G- into the guides at the fuel delivery unit and press upwards until it latches into position.
- Reinsert plug connection of lines and check for correct installation of the sender.
- Install fuel delivery unit
⇒ "1.3 Removing and installing fuel delivery unit", page 124 .



1.4.2 Fuel gauge sender -G- type two

Removing

- Remove fuel delivery unit
⇒ "1.3 Removing and installing fuel delivery unit", page 124 .
- Unlock the catches -arrows- using a screwdriver and pull out the sender for fuel gauge display G towards the top.

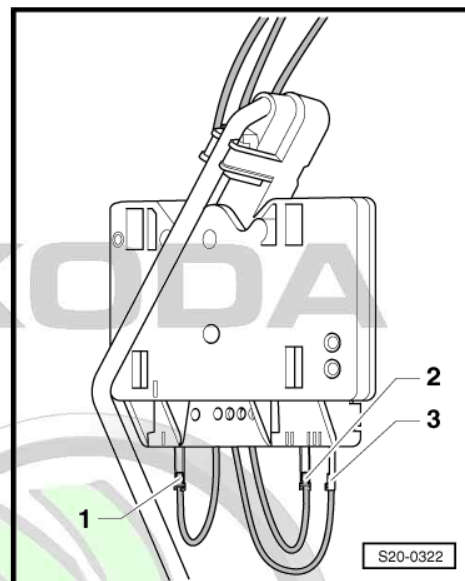


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- Unlatch and disconnect the plug connection of the lines -1- (brown), -2- (blue), -3- (black).

Install

- Unlatch the plug connection of the lines -1- (brown), -2- (blue), -3- (black).
- Insert the sender for fuel gauge display -G- in the guides at the fuel delivery unit and press downwards until the latches lock into position.
- Check correct seating of the sender.
- Install fuel delivery unit
⇒ [“1.3 Removing and installing fuel delivery unit”, page 124](#) .



1.5 Removing and installing the fuel tank

Special tools and workshop equipment required

- ◆ Engine and gearbox jack . e.g. -V.A.G 1383 A-

Removing

- The fuel tank must not be more than $\frac{1}{4}$ full.



Note

- ◆ *Empty the fuel tank if necessary*
⇒ [“1.2 Extract fuel from the fuel tank”, page 122](#) or use fuel suction device -VAS 5190- .
- ◆ *Observe safety measures and rules of cleanliness when working on the fuel supply*
⇒ [“2.3 Safety precautions and rules for cleanliness when working on petrol fuel supply system”, page 10](#) .
- ◆ *Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)*
⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#) .
- Switch off all electrical components and withdraw key from ignition lock.
- Removing rear seat bench ⇒ Body Work; Rep. gr. 72 .
- Remove the cover from the fuel delivery unit.
- For vehicles with auxiliary heating, the plug connection for the dosing pump -V54- must also be separated.

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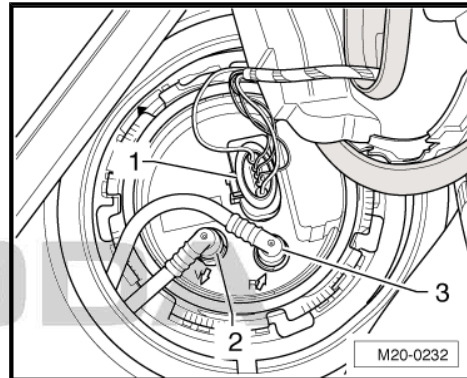


- Unplug connector -1- from fuel temperature sender.
- Unscrew right rear wheel.
- Remove the rear right wheelhouse liner ⇒ Body Work; Rep. gr. 66 .

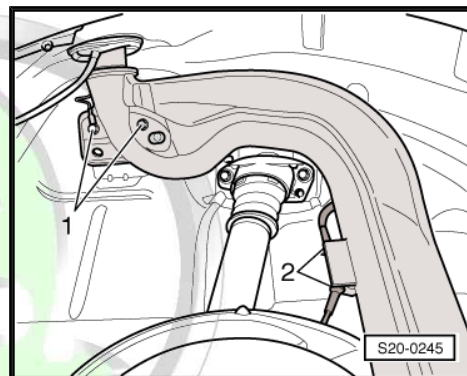


Note

Pay particular attention to the filler neck and the LPG line in the fuel tank lid unit on vehicles with engine identification characters CHGA.



- Unscrew screws -1- for filler neck on the body.
- Unclip the electrical cable from the bracket -2- at the top and bottom of the filler neck.
- Slacken front clamping sleeve at exhaust sleeve and push clamping sleeve to the rear.
- Push out all suspensions of rear muffler from the retaining straps. The exhaust system must then be lowered slightly and tied up with a wire to the body.



WARNING

The fuel feed line is pressurized! Place cleaning cloths around the connection point before detaching hose connections. Reduce pressure by carefully removing the hose.

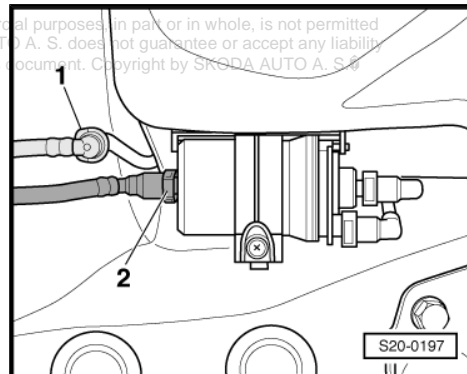
- Disconnect vent line -1- (white) and feed line -2- (black) at the connection point.

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Note

- ♦ *For vehicles with auxiliary heating, the fuel line for the dosing pump - V54- must also be disconnected.*
- ♦ *Press in the securing ring in order to unlock the fuel lines.*

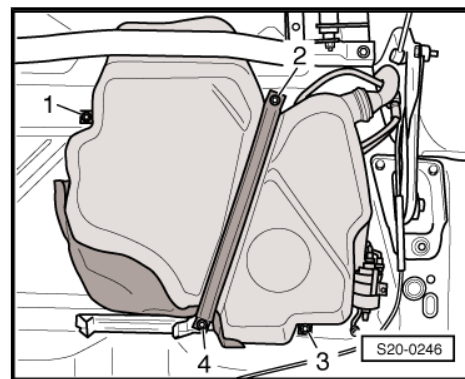


- Release fixing screws -2- and -4- and remove the tensioning strap.
- Support the fuel tank using the engine and gearbox jack - V.A.G 1383 A- .
- Release fixing screws -1- and -3-.
- Slightly lower the fuel tank.



Note

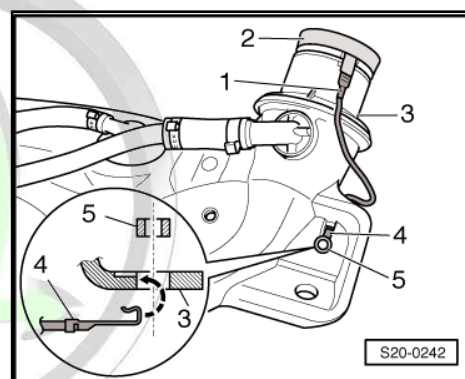
- ◆ Pay particular attention to the filler neck and the LPG line in the fuel tank lid unit on vehicles with engine identification characters CHGA.
- ◆ The filler neck must be "extracted" between body and rear axle. Lift fuel tank down from the engine and gearbox jack - V.A.G 1383 A- with a 2nd mechanic.



Install

Installation occurs in reverse order. Pay attention to the following:

- ◆ Lay the vent and fuel lines without any kinks.
- ◆ Do not mix-up the feed line and the return-flow line (the return-flow line is blue or has a blue marking, the feed line is black).
- ◆ Make sure the line connections fit tightly.
- ◆ After installing the fuel tank, check whether the feed, return-flow and vent lines are still clipped in place on the fuel tank.
- ◆ Pay attention to the required measures after connecting the battery ⇒ Electrical System; Rep. gr. 27 .
- ◆ Venting air from the fuel system
⇒ ["1.9 Venting air from the fuel system", page 139](#) .
- ◆ Query fault memories, rectify any faults and erase fault memories ⇒ Vehicle diagnostic tester.
- Check both earth connections for corrosion, if necessary remove corrosion.
- Check fitting position of the earth lead -1-.
- The plug -1- on the metal plate ring -2- must be placed on firmly.
- The contact tab -4- must be hung on the fuel tank -3- and secured with the spacer bush -5-.



1.6 Summary of components - fuel filter

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1 - Fuel filter

- ☐ with integrated pressure regulator - opening pressure: 0.4 MPa (4 bar)
- ☐ The direction of flow is indicated with an arrow - do not switch connections
- ☐ Fitting position
⇒ [Fig. "Fitting position", page 131](#)

2 - Fuel feed line

- ☐ black
- ☐ from fuel tank
- ☐ press in the circlip to unlock

3 - Fuel return-flow line

- ☐ blue
- ☐ to fuel tank
- ☐ press in the circlip to unlock

4 - Fuel feed line

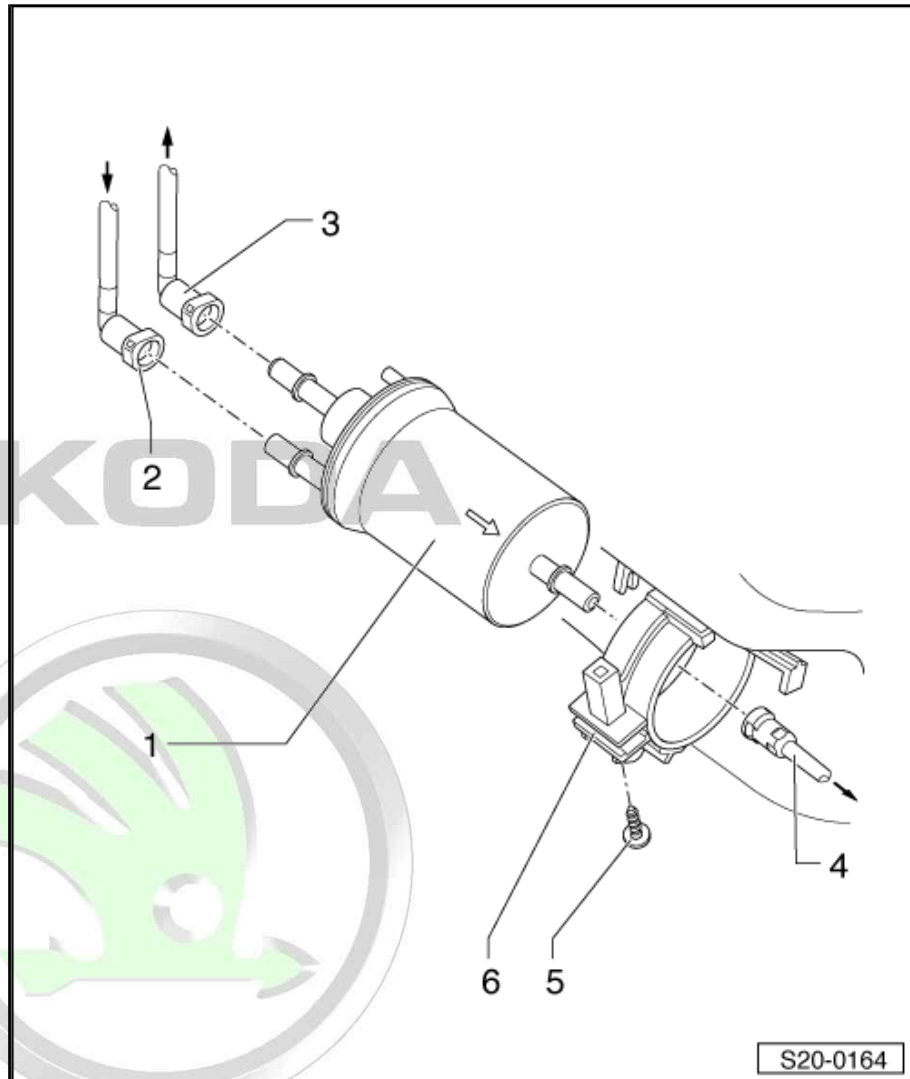
- ☐ black
- ☐ to the engine
- ☐ press in the circlip to unlock

5 - Screw

- ☐ 3 Nm

6 - Support

- ☐ for fuel filter
- ☐ attached to the fuel tank



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1.7 Removing and installing fuel filter

Special tools and workshop equipment required

- ◆ Catch pan , e.g. -VAS 6208-



Note

- ◆ *Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)*
⇒ ["2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)", page 8](#).
- ◆ *Observe safety measures and rules of cleanliness when working on the fuel supply*
⇒ ["2.3 Safety precautions and rules for cleanliness when working on petrol fuel supply system", page 10](#).

Removing

- Place a catch pan under the fuel filter.



WARNING

The fuel system is under pressure! Before opening the system lay cleaning cloths around the connection point. Reduce pressure by carefully releasing the connection point.

- Disconnect fuel lines -1-, -2- and -3-, to do so press the release button.
- Unscrew bolt -4-.
- Remove fuel filter:

Install

Installation is performed in the reverse order, pay attention to the following points:

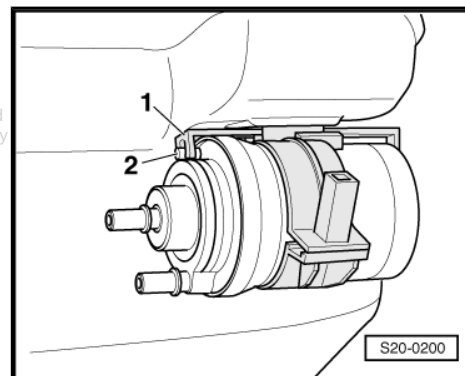
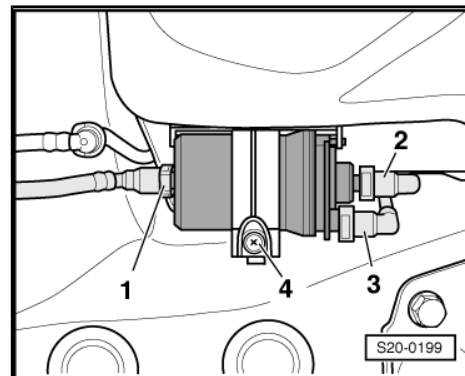
The flow direction is marked by arrows on the filter housing.

- Venting air from the fuel system
⇒ [“1.9 Venting air from the fuel system”, page 139](#) .

Fitting position

Pin -2- at filter housing must engage in the recess of the guide
-1- at the filter holder.

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1.8 Testing fuel pump

⇒ [“1.8.1 Checking the function and supply voltage”, page 132](#)

⇒ [“1.8.2 Check fuel flow rate”, page 133](#)

⇒ [“1.8.3 Check power consumption”, page 136](#)

⇒ [“1.8.4 Checking the non-return valve on the fuel pump”, page 137](#)

Special tools and workshop equipment required

- ◆ Wrench for union nut - T30101 (3087)-
- ◆ Pressure gauge , e.g. -V.A.G 1318-
- ◆ Adapter , e.g. -V.A.G 1318/11-
- ◆ Adapter , e.g. -V.A.G 1318/1-
- ◆ Adapter , e.g. -V.A.G 1318/17-
- ◆ Remote control , e.g. - V.A.G 1348/3A-
- ◆ Measuring tool set , e.g. -V.A.G 1594 A, B nebo C-
- ◆ Adapter for measuring method/DSO (5-pin) , e.g. -VAS 5565-
- ◆ Hand multimeter , e.g. -V.A.G 1715-
- ◆ Measuring vessel



1.8.1 Checking the function and supply voltage

Test conditions

- Battery voltage at least 11,5 V.
- Fuel pump relay - J17 - O.K.
- Fuel pump fuse O.K. ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.



Note

The function of the fuel pump is tested with the actuator diagnosis.

- Removing rear seat bench ⇒ Body Work; Rep. gr. 72 .
- Connect ⇒ Vehicle diagnostic tester.
- Switch on ignition.
- On the display tip consecutively the buttons for “Vehicle self-diagnosis”, “01 - Engine electronics” and “03 - Actuator diagnosis”.
- On the display, press the right arrow key to activate the pressure pump relay - J17- .
- The fuel pump must be pulsed for start-up.



Note

The fuel pump runs very quietly.

- Switch off ignition.

If the fuel pump does not run:

- Remove the cover from the fuel delivery unit.



Note

For vehicles with auxiliary heating, the plug connection for the dosing pump - V54- must be disconnected additionally.

- First of all check the plug -arrow- for correct fit. To do so, pull on the plug without pressing the catch.

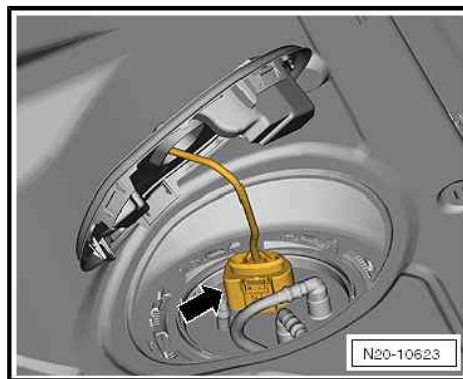
If the plug was not correctly plugged in:

- Repeat the functional test of the fuel pump.

If the plug was correctly plugged in:

- Disconnect the plug -arrow- from the fuel delivery unit.
- Check contacts on plug and on fuel pump for damage.

If no damage was detected:



- Connect the adapter for measuring method/DSO (5-pin) - VAS 5565- to the plug and to the fuel delivery unit.
- Connect the handheld multimeter - V.A.G 1715- to the terminals -1 and 5- of the adapter for measuring method/DSO (5-pin) - VAS 5565- .
- Once again initiate the “03 - Actuator diagnosis” and actuate the fuel pump relay - J17- , the voltage must be pulsed in order to increase.

Supply voltage not O.K.:

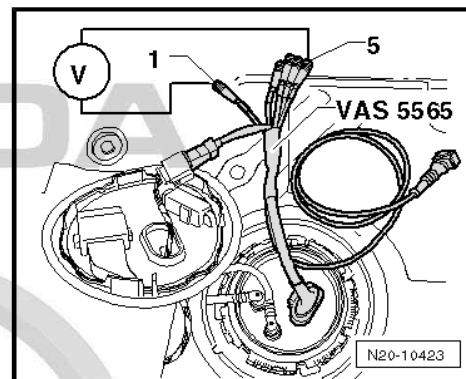
- Determine and remove open circuit in the wiring according to the current flow diagram ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

Supply voltage O.K.:

- Remove fuel delivery unit
⇒ [“1.3 Removing and installing fuel delivery unit”, page 124](#) .
- Check whether the electric wiring between the flange and fuel pump is connected.

If there is no open circuit in the wiring:

- Fuel pump defective, replace fuel delivery unit
⇒ [“1.3 Removing and installing fuel delivery unit”, page 124](#) .



1.8.2 Check fuel flow rate

Test conditions

- Supply voltage o.k.
- Fuel pressure regulator and holding pressure o.k.
- Switch off ignition and all electrical loads, and pull out ignition key.
- Removing rear seat bench ⇒ Body Work; Rep. gr. 72 .
- Remove the cover from the fuel delivery unit.



Note

For vehicles with auxiliary heating, the plug connection for the dosing pump - V54- must be disconnected additionally.

- First of all check the plug -arrow- for correct fit. To do so, pull on the plug without pressing the catch. If the plug was not correctly plugged in, it may have caused a fault.
- Disconnect the plug -arrow- from the fuel delivery unit.
- Check contacts on plug and on fuel pump for damage.





- Connect test instrument adapter/DSO (5-pin) - VAS 5565- to connector and fuel delivery unit.
- Connect the remote control - V.A.G 1348/3A- to the adapter - VAS 5565- and to the battery positive (+).



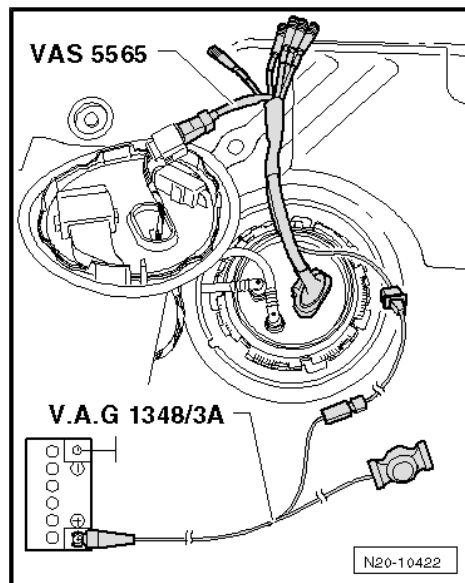
Note

- ◆ *This step is only intended to ensure that the fuel delivery unit runs when the engine is switched off.*
- ◆ *The fuel flow rate of the fuel delivery unit is measured at 0.4 MPa (4 bar). Therefore the fuel pressure must be checked before measuring the fuel flow rate.*



WARNING

The fuel system is under pressure! Before opening the system lay cleaning cloths around the connection point. Reduce pressure by carefully releasing the connection point.



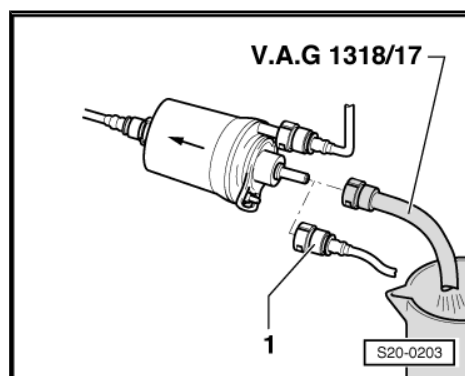
- Detach return-flow line -1- from fuel pressure regulator.



Note

Press in the securing ring in order to unlock the fuel line.

- Connect adapter -V.A.G 1318/17- at fuel pressure regulator and hold the end of the adapter in a measuring vessel.
- Operate remote control -V.A.G 1348/3A- for about 5 seconds, in order to fill up the fuel filter.
- Drain the measuring vessel.
- The fuel flow rate of the fuel delivery unit is dependent on the voltage. Therefore, connect the handheld multimeter - V.A.G 1715- to the terminals -1 and 5- of the adapter for measuring method/DSO (5-pin) - VAS 5565- .
- Activate remote control for 30 seconds while measuring the battery voltage.



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- Compare the fuel rate with the specified value.

*) Minimum fuel flow rate in $\text{cm}^3/30 \text{ s}$

***) Voltage at fuel delivery unit when engine not running and delivery unit operating.

Read out examples:

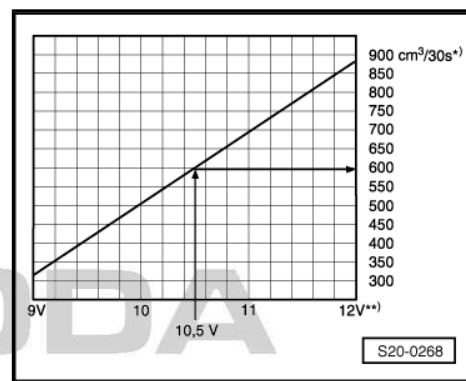
During the test a voltage of 10.5 V was measured. Thus a minimum flow rate of $580 \text{ cm}^3/30 \text{ s}$ is obtained.

If the minimum fuel delivery volume is not reached:

- Check the feed line to the filter for possible restrictions (kinks) or blocking.

If the fuel line is O.K.:

- Check the fuel flow rate before the fuel filter.



WARNING

The fuel feed line is pressurized! Place cleaning cloths around the connection point before detaching hose connections. Reduce pressure by carefully removing the hose.

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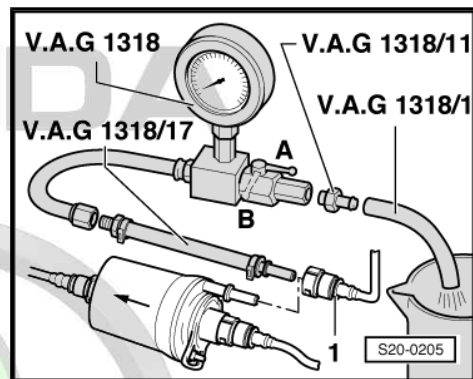
- Disconnect the feed line -1- from the fuel filter inlet.



Note

Press in the securing ring in order to unlock the fuel line.

- Connect pressure gauge -V.A.G 1318- with adapter set -V.A.G 1318/17- as shown.
- Fit adapter -V.A.G 1318/1- onto adapter -V.A.G 1318/11- of pressure gauge and hold in a measuring vessel.
- Open shut-off cock of the pressure gauge. The lever then points in the direction of flow -A-.
- Activate remote control -V.A.G 1348/3A- . While doing so, slowly close the shut-off cock until the pressure gauge displays 0.4 MPa (4 bar) overpressure. Do not make any further changes to the position of the shut-off cock.
- Drain the measuring vessel.
- Activate remote control again for 30 seconds. Compare the fuel flow rate with the value determined during the first measurement.



If the minimum fuel flow rate is now reached:

- Replace fuel filter.

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If the minimum fuel flow rate is again not reached:

- Remove fuel delivery unit and inspect filter strainer for soiling.

If you have still not found any fault up to this stage:

- Replace fuel delivery unit.
- Connect all released fuel lines.
- Venting air from the fuel system
⇒ ["1.9 Venting air from the fuel system", page 139](#) .

If the required fuel delivery volume has been achieved, but a fault is still suspected in the fuel supply system (e.g. intermittent breakdown of the fuel supply):

- Check power consumption of the fuel pump.
⇒ ["1.8.3 Check power consumption", page 136](#)

1.8.3 Check power consumption

- Removing rear seat bench ⇒ Body Work; Rep. gr. 72 .
- Remove the cover from the fuel delivery unit.



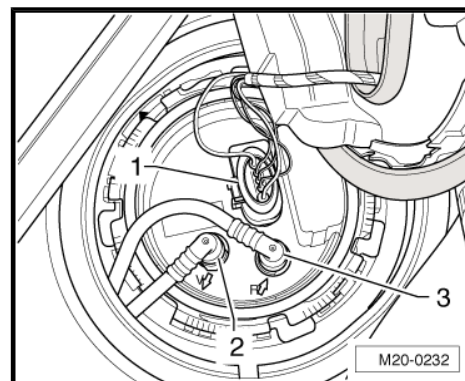
Note

For vehicles with auxiliary heating, the plug connection for the dosing pump - V54- must be disconnected additionally.

- First of all check the plug -1- for correct fit. To do so, pull on the plug without pressing the catch. If the plug was not correctly plugged in, it may have caused a fault.
- Now unplug the plug -1-.
- Check contacts on plug and on fuel pump for damage.

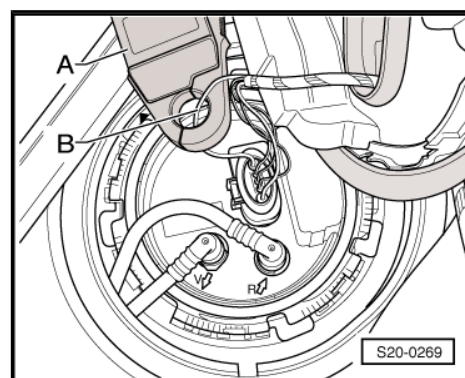
If no damage was detected:

- Fit again plug -1-.



- Connect the current probe -A- of the vehicle diagnosis, measurement and information system - VAS 505X- on the line -B- to contact 1 of the 5-pin plug.

If the current probe cannot be connected on the line -B- to contact 1 of the 5-pin plug because of the length of the insulation:

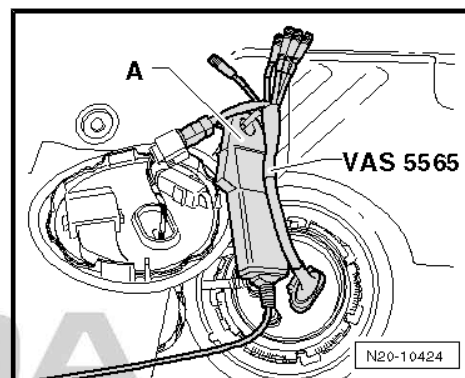


- Connect the adapter for measuring method/DSO (5-pin) - VAS 5565- to the plug and to the fuel delivery unit.
- Connect the current probe -A- to the red cable - with the lettering "current probe" - of the adapter for measuring method/DSO (5-pin) - VAS 5565- .

Continued for all

- Start engine and run in idle.
- Measure voltage consumption of the fuel pump.

Specified value: max. 9 A



Note

If the fault in the fuel supply system is intermittent then tests can be undertaken during a test drive but then two people are required for this.

If the specified current uptake is exceeded:

- Fuel pump defective, replace fuel delivery unit
⇒ ["1.3 Removing and installing fuel delivery unit", page 124](#) .

1.8.4 Checking the non-return valve on the fuel pump

- Removing rear seat bench ⇒ Body Work; Rep. gr. 72 .
- Remove the cover from the fuel delivery unit.



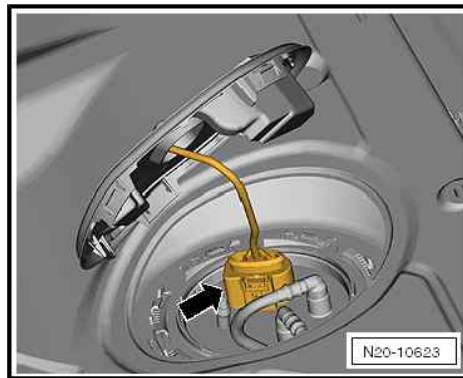
Note

For vehicles with auxiliary heating, the plug connection for the dosing pump - V54- must be disconnected additionally.

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- First of all check the plug -arrow- for correct fit. To do so, pull on the plug without pressing the catch. If the plug was not correctly plugged in, it may have caused a fault.
- Disconnect the plug -arrow- from the fuel delivery unit.
- Check contacts on plug and on fuel pump for damage.

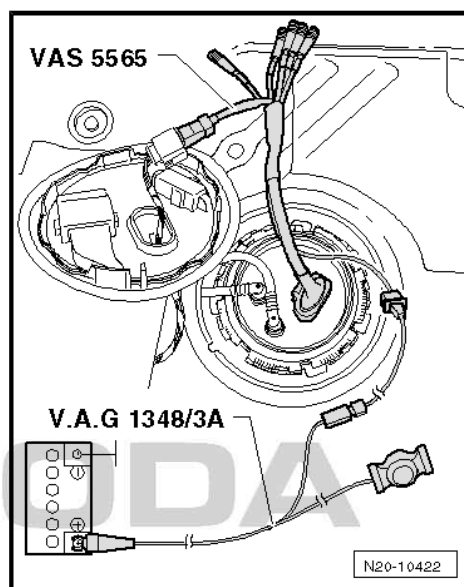


- Connect test instrument adapter/DSO (5-pin) - VAS 5565- to connector and fuel delivery unit.
- Connect the remote control - V.A.G 1348/3A- to the adapter - VAS 5565- and to the battery positive (+).



WARNING

The fuel feed line is pressurized! Place cleaning cloths around the connection point before detaching hose connections. Reduce pressure by carefully removing the hose.



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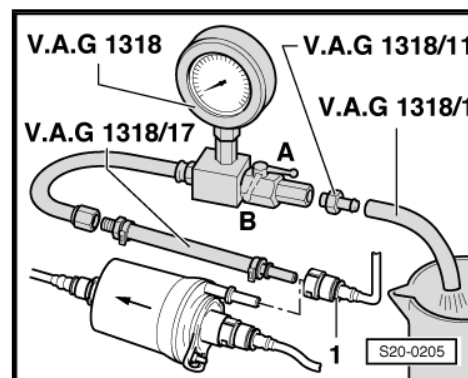
- Disconnect the feed line -1- from the fuel filter inlet.



Note

Press in the securing ring in order to unlock the fuel line.

- Connect pressure gauge with adapter set -V.A.G 1318/17- as shown.
- Fit adapter -V.A.G 1318/1- onto adapter -V.A.G 1318/11- of pressure gauge and hold in a measuring vessel.
- Close the shut-off cock of the pressure gauge -V.A.G 1318- (set the lever at right angles to the direction of flow of fuel -B-).
- Activate the remote control with short pauses in between until an overpressure of 0.4 MPa (4 bar) is built up.



WARNING

Danger of liquid spraying out when opening the shut-off cock; hold the container in front of the free connection to the pressure gauge.

- Lower an overpressure which has become too high by carefully opening the shut-off valve.
- Observe pressure drop at pressure gauge. The pressure must not drop below 0,3 MPa (3 bar) after 10 minutes.

If the pressure still drops:

- Check line connections for leaktightness.

If the lines are not found to be faulty:

- Fuel pump defective, replace fuel delivery unit.

1.9 Venting air from the fuel system



Note

- ◆ *In order to avoid damage to the catalyst, the fuel system without return-flow line must be bled after working on the fuel lines or at the fuel filter. The vehicle can only be started after bleeding.*
- ◆ *Observe safety measures and rules of cleanliness when working on the fuel supply*
⇒ *"2.3 Safety precautions and rules for cleanliness when working on petrol fuel supply system", page 10*.

Special tools and workshop equipment required

- ◆ Remote control - V.A.G 1348/3 A-
- ◆ Adapter for measuring method/DSO (5-pin) , e.g. -VAS 5565-
- ◆ Adapter - V.A.G 1318/20-
- ◆ Adapter - V.A.G 1318/20-1-
- ◆ Hose clamps 40 mm , e.g. -T30096 (3093)-



WARNING

- ♦ **The fuel system is under pressure! Before opening the system lay cleaning cloths around the connection point. Reduce pressure by carefully releasing the connection point.**

- Removing rear seat bench ⇒ Body Work; Rep. gr. 72 .
- Remove the cover from the fuel delivery unit.



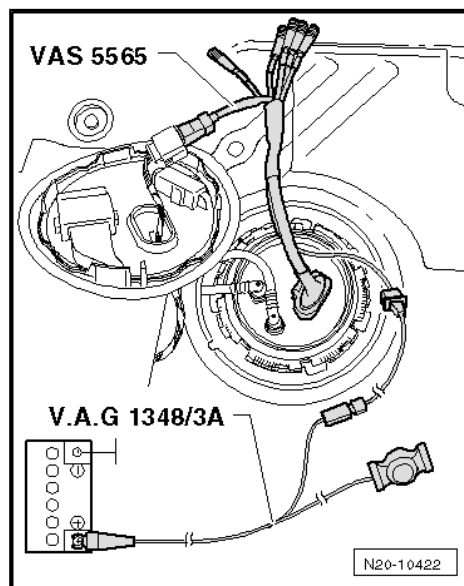
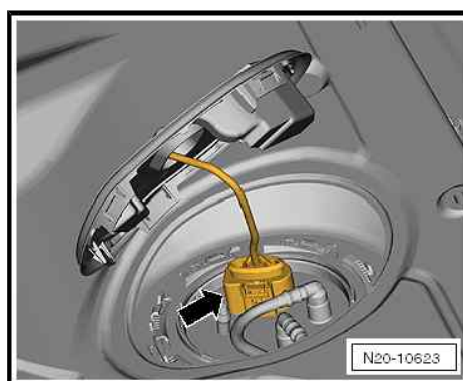
Note

For vehicles with auxiliary heating, the plug connection for the dosing pump - V54- must be disconnected additionally.

- Disconnect the plug -arrow- from the fuel delivery unit.
- Check contacts on plug and on fuel pump for damage.

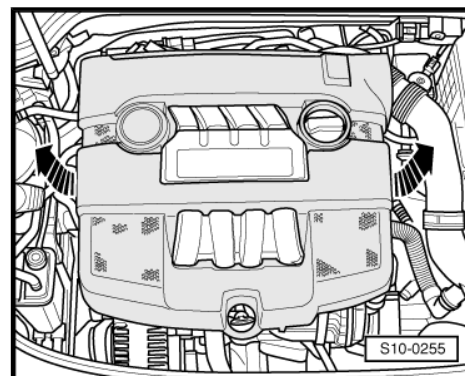
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- Connect test instrument adapter/DSO (5-pin) - VAS 5565- to connector and fuel delivery unit.
- Connect the remote control - V.A.G 1348/3A- to the adapter - VAS 5565- and to the battery positive (+).

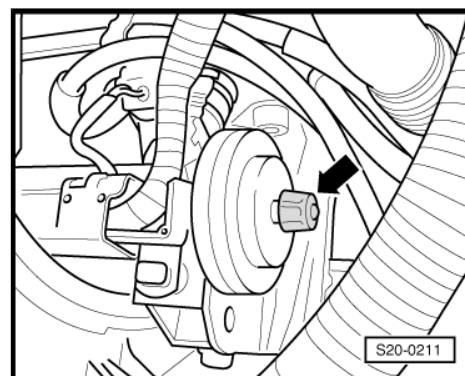


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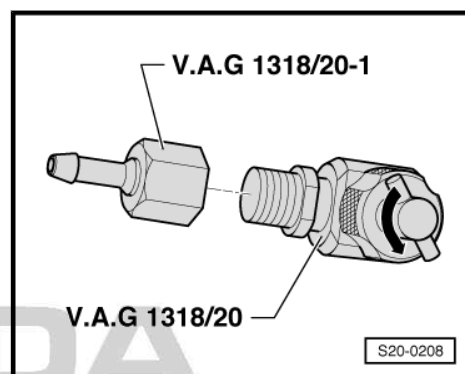
- If present, remove engine cover -arrows-.



- Remove the ventilation valve cap -arrow-.

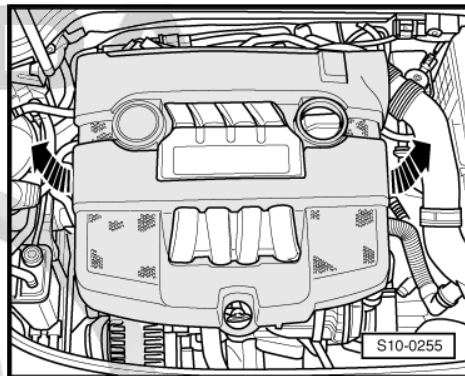


- Screw adapter -V.A.G 1318/20-1- onto adapter -V.A.G 1318/20- .
- Turn the valve (at T-union) anti-clockwise, until it is fully opened.
- Screw adapter -V.A.G 1318/20- firmly onto the vent valve.
- Connect hose with catch pan to adapter -V.A.G 1318/20-1- .
- Screw valve (at T-union) clockwise up to the stop into the vent valve.
- Check the adapter and hose connections for leaktightness.
- Activate remote control -V.A.G 1348/3A- .
- As soon as fuel flows out of the hose without bubbles, unscrew valve (at T-piece) anti-clockwise, until no more fuel escapes.
- Cover ventilation valve with a clean cloth.
- Throttle the bleeder hose and pull off from adapter -V.A.G 1318/20-1- .
- Unscrew adapter -V.A.G 1318/20- from vent valve.
- Screw in ventilation valve cap.





- If present, install engine cover -arrows-.



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2 Removing and installing parts of the fuel supply system (LPG)

⇒ [“2.1 Summary of components - fuel tank with attached parts”, page 143](#)

⇒ [“2.1 Summary of components - fuel tank with attached parts”, page 143](#)

⇒ [“2.3 Emptying and filling up gas line”, page 144](#)

⇒ [“2.4 Closing the liquefied petroleum gas reservoir”, page 149](#)

⇒ [“2.5 Removing and installing the multi-function valve for the fuel tank”, page 150](#)

⇒ [“2.6 Removing and installing the liquefied petroleum gas reservoir”, page 151](#)

⇒ [“2.7 Removing and installing gas filter”, page 153](#)

2.1 Summary of components - fuel tank with attached parts

1 - Screw

- ☐ with integrated gasket ring
- ☐ replace the screw if the gasket ring is damaged
- ☐ 2 Nm

2 - Screw cap

- ☐ with integrated gasket ring
- ☐ replace the cap if the gasket ring is damaged

3 - Fuel tank

- ☐ in the spare wheel well
- ☐ removing and installing
⇒ [“2.6 Removing and installing the liquefied petroleum gas reservoir”, page 151](#)

4 - Gas feed line

- ☐ to the evaporator
- ☐ 10 Nm

5 - Gas filler line

- ☐ from filler neck
- ☐ 15 Nm

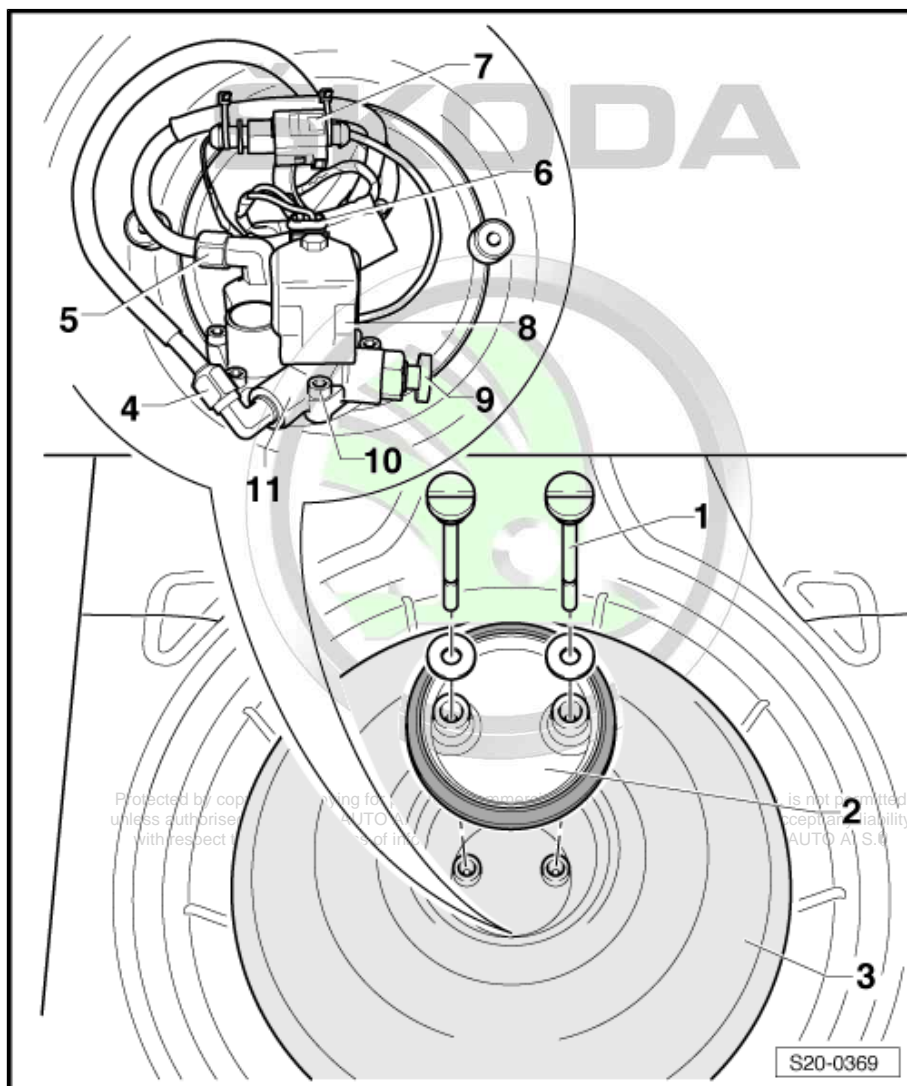
6 - Connector

7 - Connector

- ☐ to sender for gas level indicator - G707-

8 - Solenoid valve for activated charcoal filter - N495-

- ☐ 5 Nm





9 - Mechanical shut-off valve for gas feed line

10 - Screw

- ☐ tighten in the prescribed sequence and in two stages
⇒ ["2.5 Removing and installing the multi-function valve for the fuel tank", page 150](#)

1st stage: 3 Nm

2nd stage: 5 Nm

11 - Multi-function valve for fuel tank

- ☐ removing and installing
⇒ ["2.5 Removing and installing the multi-function valve for the fuel tank", page 150](#)
- ☐ with safety valve

2.2 Summary of components - evaporator with attached parts

1 - Evaporator

- ☐ removing and installing
⇒ [page 158](#)
- ☐ check ⇒ Maintenance ;
Booklet Octavia II.

2 - Support

3 - Screw

- ☐ 10 Nm

4 - Screw

- ☐ 23 Nm

5 - Gas line

- ☐ from liquefied petroleum gas reservoir
- ☐ 10 Nm

6 - Gas filter housing with high-pressure valve for gas mode - N372-

- ☐ Replace gas filter
⇒ ["2.7.3 Replacing the filter on the evaporator", page 155](#)

7 - Gas feed line

- ☐ to the gas inlet valves

8 - Spring strap clamp

9 - Coolant hose

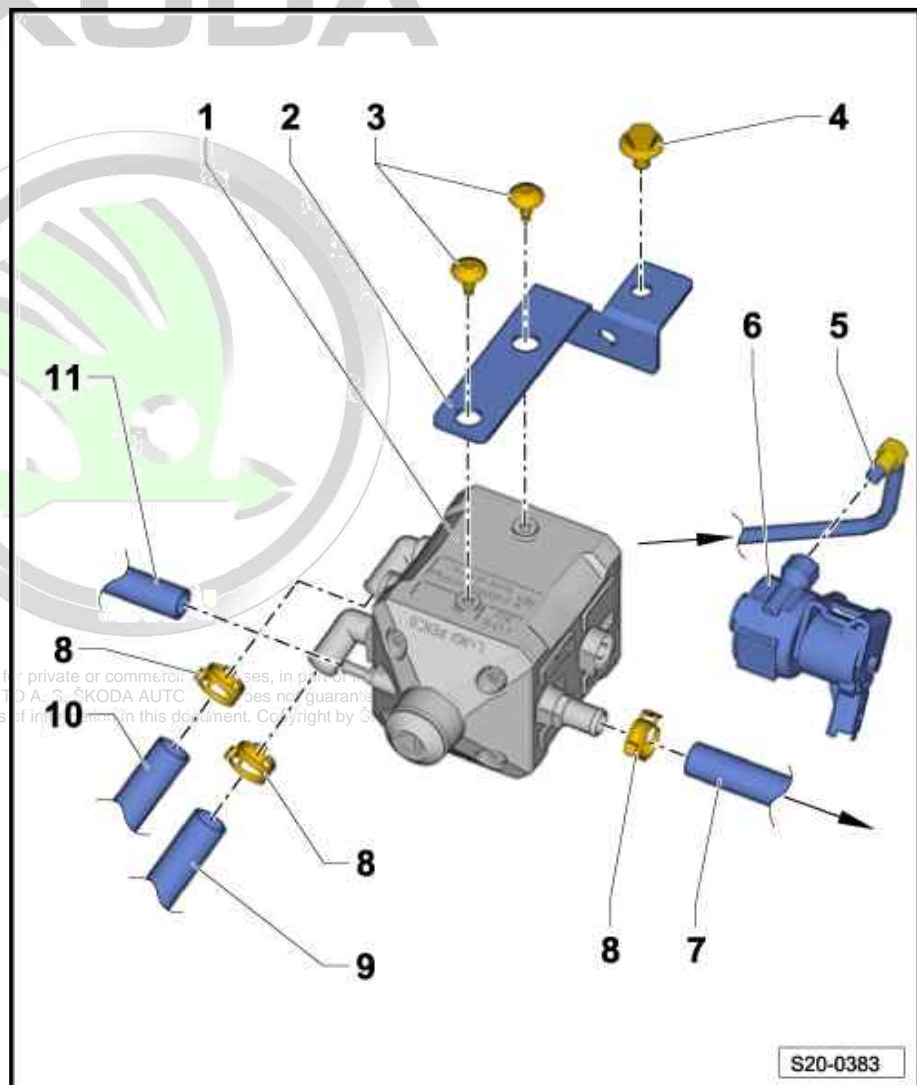
- ☐ Coolant return-flow

10 - Coolant hose

- ☐ Coolant feed

11 - Vacuum hose

- ☐ To intake manifold



2.3 Emptying and filling up gas line

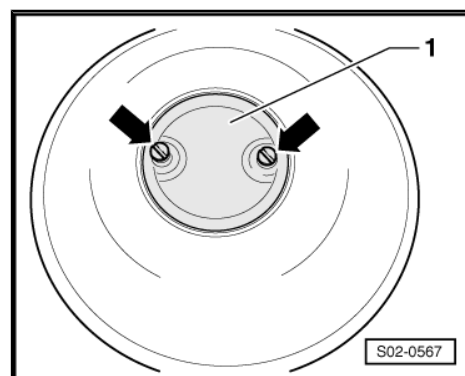
The components of the liquefied petroleum gas system, on which installation work should be carried out, must first of all be emptied.

Empty gas line



Note

- ◆ *Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)*
⇒ *"2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8.*
- ◆ *The protective cover of the liquefied petroleum gas reservoir and the screws are sealed for safety reasons. When removing, do not damage any gasket and gasket rings.*
- Loosen the screws -arrows- on the cap of the multi-function valve and remove the cap -1-.



Note

The waiting time for the change-over to LPG mode does not only depend on the lambda probe being ready for operation (waiting time at least approx. 30s) but also on the operational readiness of the complete LPG system. This may take a few minutes.

For vehicles manufactured up to 12.2010 (exhaust emission standard EU-4)



Note

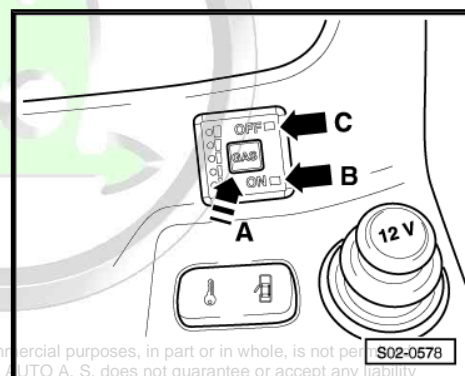
- ◆ *A switch-over into the gas mode can take place after the engine temperature has risen above 30 °C and the engine speed has exceeded 1201 rpm.*
- ◆ *The engine always starts in the petrol mode. If the vehicle was operating in LPG mode before switching off the engine, the system will change over to LPG mode automatically and the conditions for the change-over are fulfilled.*
- Start engine and switch fuel selector switch -E395- to gas mode arrow -A-. When in gas mode, the warning light "ON" arrow -B- lights up on the fuel selector switch -E395-.

For vehicles manufactured as of 01.2011 (exhaust emission standard EU-5)



Note

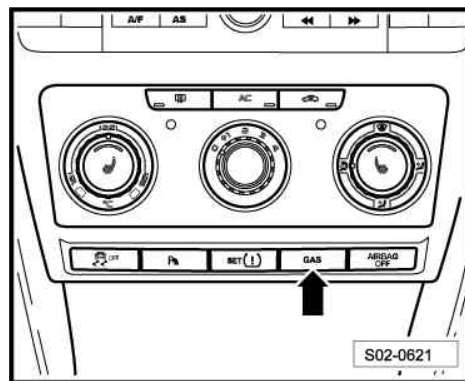
- ◆ *A switch-over into the gas mode can take place after the engine temperature has risen above 40 °C and the engine speed has exceeded 1201 rpm.*
- ◆ *The engine always starts in the petrol mode. The system will change over to LPG mode automatically if the conditions for the change-over are fulfilled.*
- Start engine.





- Press the -GAS- button in the centre console -arrow-.

The text “System switches to petrol mode” appears in the information display -3-.

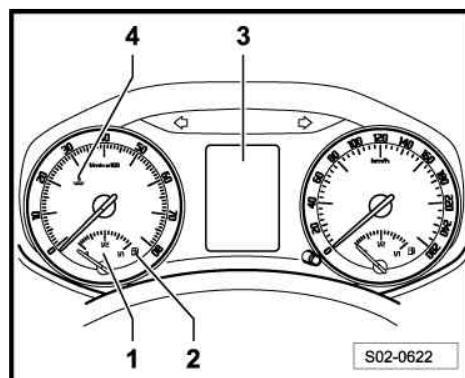


If the engine switches successfully to LPG operation, this is displayed by the warning light -2- lighting up in the dash panel insert and the text “Engine is running in gas mode” appears in the information display -3-.



Note

Various texts concerning the complete LPG system are shown in the information display of the dash panel insert (including LPG fueling), e.g. “The gas mode is not possible at present. Owner's manual” ⇒ *Vehicle Operating Instructions*.

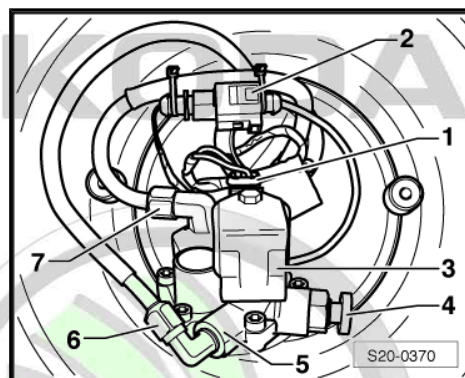


Continued for all vehicles

- Close off the mechanical shut-off valve for the gas feed line -4- on the multi-function valve by turning it clockwise as far as the stop.

For vehicles manufactured up to 12.2010 (exhaust emission standard EU-4)

- Wait until there is “no more” gas in the liquefied petroleum gas system and a shortage of gas is indicated when the LED on the switch -E395- flashes and an acoustic signal can be heard. It is switched-over to the petrol mode.



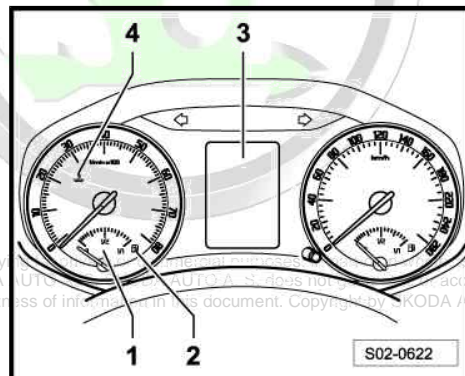
For vehicles manufactured as of 01.2011 (exhaust emission standard EU-5)

- Wait until there is “no more” LPG in the liquefied petroleum gas system and a shortage of LPG is indicated by an acoustic signal.

At the same time, the text “System switches to petrol mode” appears in the information display -3- of the dash panel insert.

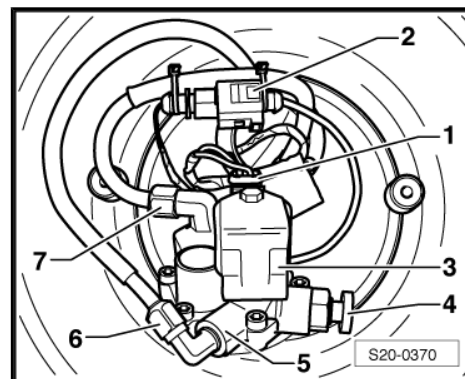
The warning light -2- in the dash panel insert goes out simultaneously. It is switched-over to the petrol mode.

Continued for all vehicles



- Disconnect the plug -1- from the valve for gas tank - N495- .
- Switch off the ignition and disconnect the negative pole of the battery.

Fill up gas line

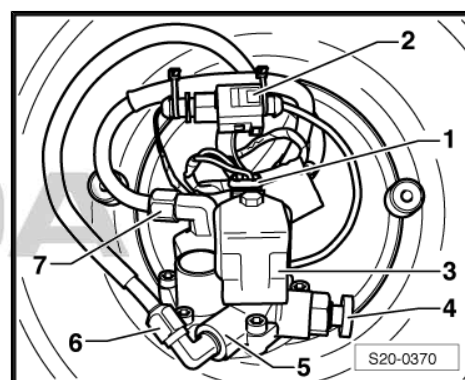


- Connect plug -1- at valve for gas tank - N495- .
- Close off the mechanical shut-off valve -4- on the multi-function valve by turning it anti-clockwise as far as the stop.



Caution

Check the compressed natural gas system for leaks, e.g. with a gas leakage detector for natural gas vehicles - VAS 6227- .



- Connect the negative terminal of the battery.

For vehicles manufactured up to 12.2010 (exhaust emission standard EU-4)



Note

- ◆ A switch-over into the gas mode can take place after the engine temperature has risen above 30 °C and the engine speed has exceeded 1201 rpm.
- ◆ The engine always starts in the petrol mode. If the vehicle was operating in LPG mode before switching off the engine, the system will change over to LPG mode automatically and the conditions for the change-over are fulfilled.
- ◆ The waiting time for the change-over to LPG mode does not only depend on the lambda probe being ready for operation (waiting time at least approx. 30s) but also on the operational readiness of the complete LPG system. This may take a few minutes.

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- Start engine and switch fuel selector switch -E395- to gas mode arrow -A-. When in gas mode, the warning light "ON" arrow -B- lights up on the fuel selector switch -E395-.

For vehicles manufactured as of 01.2011 (exhaust emission standard EU-5)

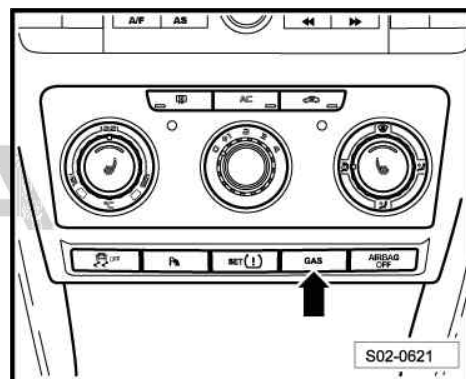
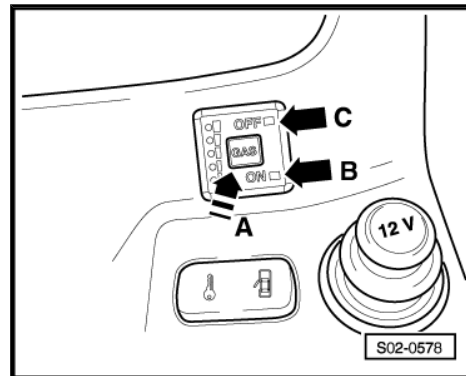


Note

- ♦ A switch-over into the gas mode can take place after the engine temperature has risen above 40 °C and the engine speed has exceeded 1201 rpm.
- ♦ The engine always starts in the petrol mode. The system will change over to LPG mode automatically if the conditions for the change-over are fulfilled.
- ♦ The waiting time for the change-over to LPG mode does not only depend on the lambda probe being ready for operation (waiting time at least approx. 30s) but also on the operational readiness of the complete LPG system. This may take a few minutes.

- Start engine.
- Press the -GAS- button in the centre console -arrow-.

The text "System switches to petrol mode" appears in the information display -3-.



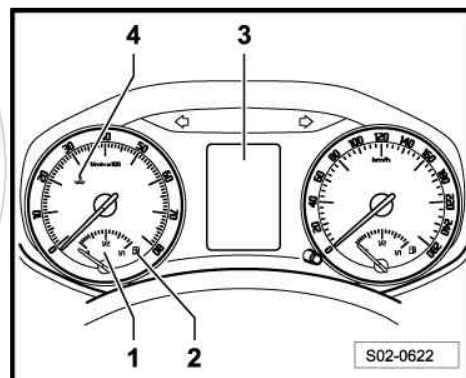
If the engine switches successfully to LPG operation, this is displayed by the warning light -2- lighting up in the dash panel insert and the text "Engine is running in gas mode" appears in the information display -3-.



Note

Various texts concerning the complete LPG system are shown in the information display of the dash panel insert (including LPG fueling), e.g. "The gas mode is not possible at present. Owner's manual!" ⇒ Vehicle Operating Instructions.

- Switch off ignition.



Note

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- ♦ The cap of the liquefied petroleum gas reservoir and the screws are sealed for safety reasons. When installing, do not damage any gasket and gasket rings.
- ♦ Replace gasket if damaged.

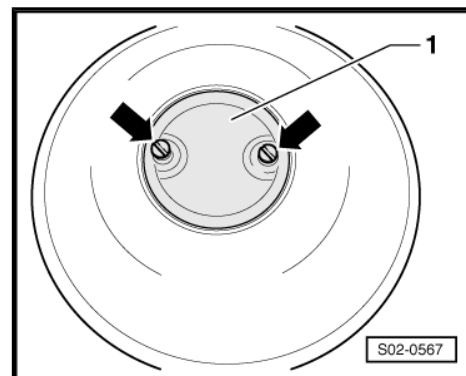
- Attach the cap of the multi-function valve -1- with the screws -arrows-. Tighten screws to 2 Nm.
- After filling the gas line, carry out a leak tightness test on the natural gas system ⇒ Maintenance ; Booklet Octavia II .

For vehicles manufactured up to 12.2010 (emission level EU-4)

- Query and erase event memory of the LPG control unit
⇒ [“2.1 Connecting the diagnostic unit, querying and erasing the event memory of the liquefied petroleum gas system \(LPG\)”](#), page 3 .

For vehicles manufactured as of 01.2011 (exhaust emission standard EU-5)

- Querying and erasing event memory of engine control unit
⇒ Vehicle diagnostic tester.

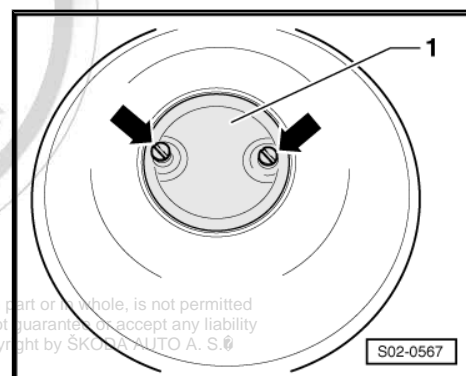


2.4 Closing the liquefied petroleum gas reservoir



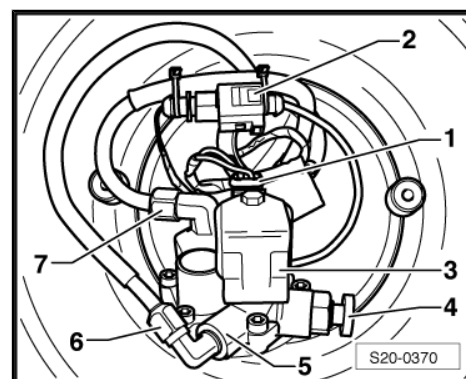
Note

- ◆ *Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)*
⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”](#), page 8 .
- ◆ *The protective cover of the liquefied petroleum gas reservoir and the screws are sealed for safety reasons. When removing, do not damage any gasket and gasket rings.*
- Slacken the screws of the protective cover for the multi-function valve -arrows- and remove the cover -1-.



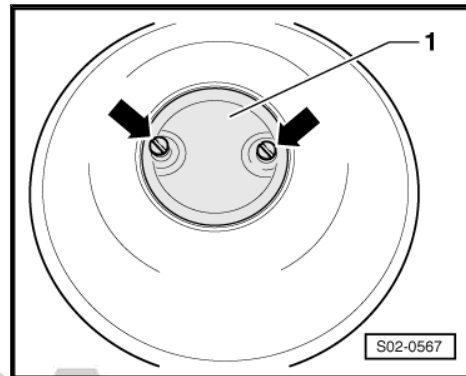
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- Close off the mechanical shut-off valve -4- for the gas supply to the evaporator on the multi-function valve by turning clockwise as far as the stop.
- Disconnect the plug -1- from the valve for gas tank - N495- .





- Attach the cap of the multi-function valve -1- with the screws -arrows-. Tighten screws to 2 Nm.



2.5 Removing and installing the multi-function valve for the fuel tank



Caution

The liquefied petroleum gas reservoir must be completely emptied before removing the multi-function valve!



Note

- ♦ Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8.
- ♦ The fuel tank is located at the rear in the spare wheel well.

Removing

- Empty gas line
⇒ "2.3 Emptying and filling up gas line", page 144.
- Cut through the tensioning straps and disconnect plug -2- for sender for gas level indicator - G707- .

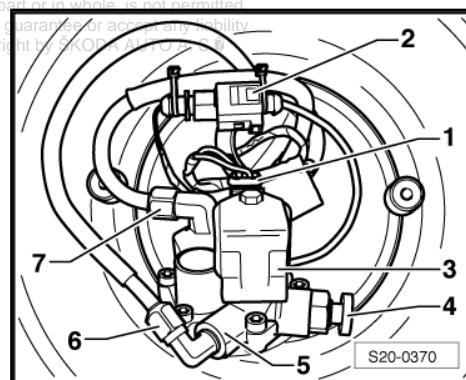


WARNING

The mechanical shut-off valve -4- for the gas supply to the evaporator must be closed!

When loosening the gas line and subsequently the multi-function valve the remaining gas can escape. Wear safety goggles and safety clothing, in order to avoid eye injuries and burns. Cover the connection points with a cloth and loosen carefully.

Do not bend the gas feed line and the gas filler line and detach them without any kinks.



- Remove the gas filler line -7- and the gas feed line -6- from the multi-function valve for fuel tank.
- Remove valve for gas tank - N495- -3-.

- Slacken the screws of the multi-function valve in the prescribed sequence -1 ... 6-.

i Note

When removing the multi-function valve, ensure that the fuel gauge sender is not bent or damaged.

- Carefully remove the multi-function valve from the fuel tank.

Install

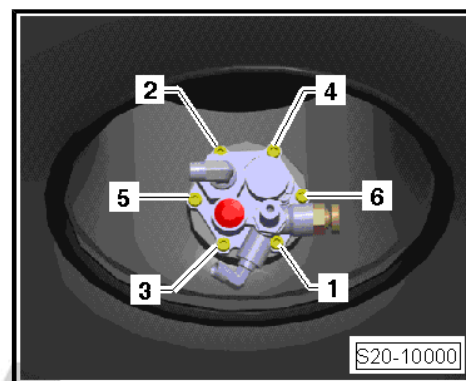
Installation is performed in the reverse order, pay attention to the following points:



WARNING

When inserting the multi-function valve, ensure that the fuel gauge sender is not bent or damaged.

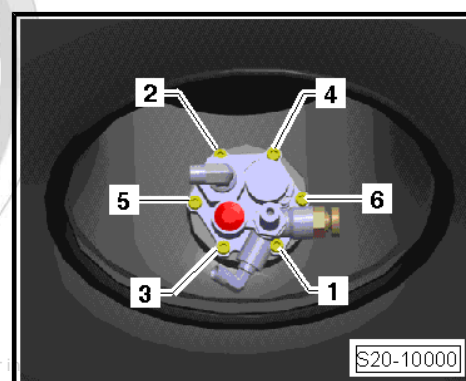
Do not bend the gas feed lines and the gas filler lines and connect them without any kinks.



- Tighten the screws of the multi-function valve in two stages and in the prescribed sequence -1 ... 6-.

Stage	Tightening torque
1.	3 Nm
2.	5 Nm

- Fill up gas line
⇒ [“2.3 Emptying and filling up gas line”, page 144](#) .
- After installing the multifunctional valve, carry out a leak tightness test on the natural gas system ⇒ Maintenance ; Booklet Octavia II .



Caution

Check the compressed natural gas system for leaks, e.g. with a gas leakage detector for natural gas vehicles - VAS 6227- .

2.6 Removing and installing the liquefied petroleum gas reservoir

i Note

- ♦ *Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)*
⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#) .
- ♦ *The fuel tank is located at the rear in the spare wheel well.*



Removing

- Empty gas line
⇒ [“2.3 Emptying and filling up gas line”, page 144](#) .

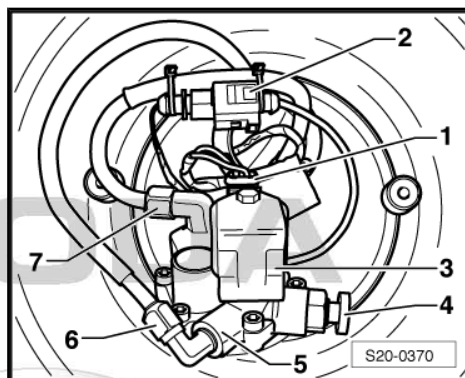


WARNING

The mechanical shut-off valve -4- for the gas supply to the evaporator must be closed!

When loosening the gas line, remaining gas may escape. Wear safety goggles and safety clothing, in order to avoid eye injuries and burns. Cover the connection points with a cloth and open carefully.

Do not bend the gas feed line and the gas filler line and detach them without any kinks.



- Remove the gas feed line -6- from the multi-function valve for the fuel tank.



Note

The multi-function valve for the fuel tank is fitted with a return flow shut-off valve which automatically shuts off the gas in the tank after detaching the gas filler line -7-.

- Remove the gas filler line -7- from the multi-function valve for the fuel tank.
- Cut through the tensioning straps and disconnect plug -2- for sender for gas level indicator - G707- .
- Unscrew the fixing screws -1- of the fuel tank.
- Remove protective cover -2-.
- With the assistance of a second mechanic, carefully lift out the fuel tank.

Install

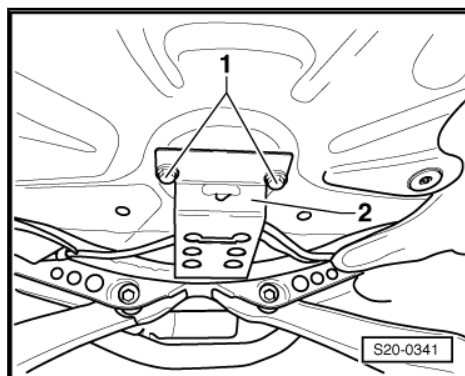
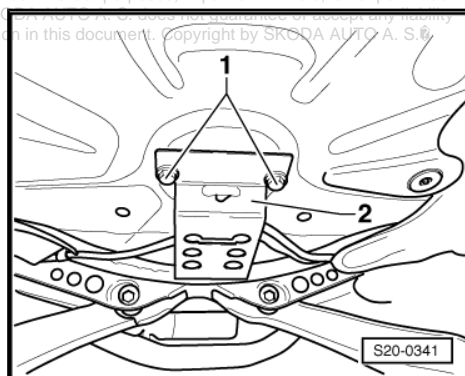
Installation is performed in the reverse order, pay attention to the following points:

- ◆ Connect the gas feed line and the gas filler line and lay them without any kinks.
- ◆ Screw in securing bolts -1- on the tank and tighten to specified torque: 80 Nm
- Fill up gas line
⇒ [“2.3 Emptying and filling up gas line”, page 144](#) .
- After installing the gas tank, carry out a leak tightness test on the natural gas system ⇒ Maintenance ; Booklet Octavia II .



Caution

Check the compressed natural gas system for leaks, e.g. with a gas leakage detector for natural gas vehicles - VAS 6227- .



2.7 Removing and installing gas filter

⇒ [“2.7.1 Removing and installing gas filter - up to 09.2012”, page 153](#)

⇒ [“2.7.2 Removing and installing gas filter - from 09.2012”, page 154](#)

⇒ [“2.7.3 Replacing the filter on the evaporator”, page 155](#)

⇒ [“2.7.4 Removing and installing the evaporator with filter housing and high-pressure valve for gas mode N372”, page 158](#)

2.7.1 Removing and installing gas filter - up to 09.2012

Removing



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#) .

- Empty gas line
⇒ [“2.3 Emptying and filling up gas line”, page 144](#) .



WARNING

When loosening the gas line, gas may escape. Wear safety goggles and safety clothing, in order to avoid eye injuries and burns. Cover the connection points with a cloth and open carefully.

- Slacken hose clamps -arrows-.
- Detach the gas hoses from the hose connections and remove the filter.

Install

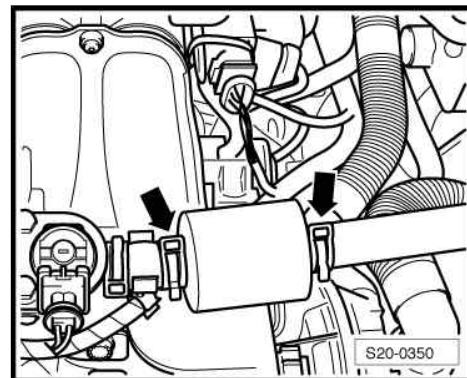
Installation is performed in the reverse order, pay attention to the following points:



Note

Observe the fitting position of the gas filter which is marked with an arrow on the filter housing. It marks the direction of the gas flow. The arrow must always point to the gas distribution line.

- Fill up gas line ⇒ [page 144](#) .
- After installing the gas filter, carry out a leak tightness test on the natural gas system ⇒ Maintenance ; Booklet Octavia II .



Caution

Check the compressed natural gas system for leaks, e.g. with a gas leakage detector for natural gas vehicles - VAS 6227- .



2.7.2 Removing and installing gas filter - from 09.2012

Removing



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8.

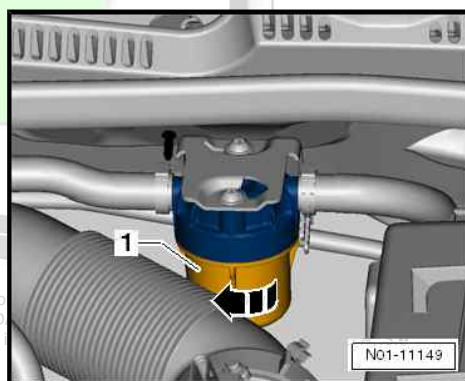
- Empty gas line
⇒ "2.3 Emptying and filling up gas line", page 144.



WARNING

Gas may escape when undoing the gas line. Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding. Cover the cap with a cloth and open carefully.

- Unscrew the cap for filter housing -1- and remove by moving it downwards.

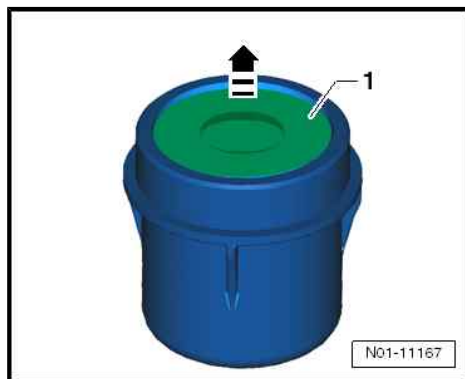


- Remove filter -1- upwards -arrow- from the lower cap for filter housing.
- Clean off dirt from the top and bottom filter cap.

Install

Installation is performed in the reverse order, pay attention to the following points:

- Check gasket rings for damage and renew if necessary.
- Fill up gas line
⇒ "2.3 Emptying and filling up gas line", page 144.
- After installing the gas filter, carry out a leak tightness test on the natural gas system ⇒ Maintenance ; Booklet Octavia II .



Caution

Check the compressed natural gas system for leaks, e.g. with a gas leakage detector for natural gas vehicles - VAS 6227- .

2.7.3 Replacing the filter on the evaporator



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#).



WARNING

When loosening the gas line, gas may escape. Wear safety goggles and safety clothing, in order to avoid eye injuries and burns. Cover the connection points with a cloth and open carefully.

Removing

- Empty gas line
⇒ [“2.3 Emptying and filling up gas line”, page 144](#).
- Remove air filter
⇒ [“1.4 Air filter with component parts - Summary of components”, page 177](#).
- Remove battery ⇒ Electrical System; Rep. gr. 27.

For vehicles manufactured up to 12.2010 (exhaust emission standard EU-4)

- Remove liquefied petroleum gas control unit
⇒ [“3.2 Removing and installing liquefied petroleum gas control unit \(for LPG vehicles\)”, page 199](#).

Continued for all vehicles

- Remove battery tray ⇒ Electrical System; Rep. gr. 27.



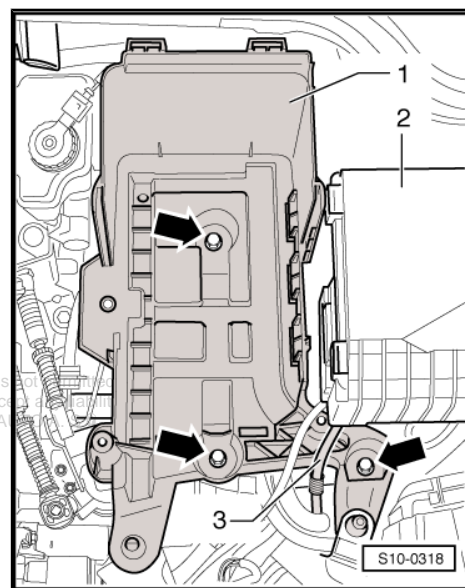
Note

On LPG vehicles (engine identification characters CHGA) spacer washers of 4 mm thickness are fitted between the battery tray and the body below the front screws -bottom arrows-.



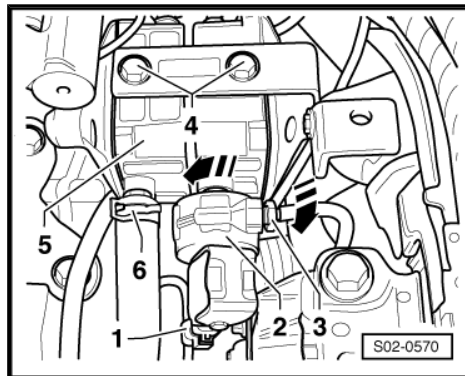
WARNING

When loosening the gas line, gas may escape. Wear safety goggles and safety clothing, in order to avoid eye injuries and burns. Cover the connection points with a cloth and open carefully.

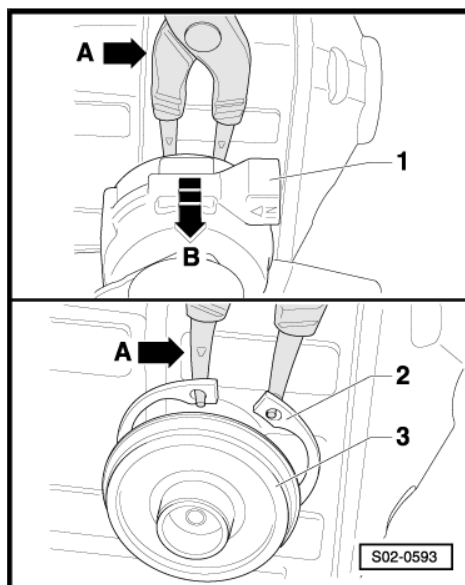




- Disconnect the plug -1- from the high-pressure valve for gas mode - N372- .
- Unscrew the screwed connection of the gas line from the gas inlet of the filter housing -3-.
- Where necessary, undo the two bolts -4- and turn the evaporator -5- until the detention ring for the filter housing is accessible.



- Unlock the circlip -2- of the filter housing -1- with right-angle circlip pliers arrow -A-.
- Remove the filter housing -1- from the flange of the evaporator -3- in direction of arrow -B-. Leave the circlip -2- behind the flange -3-.

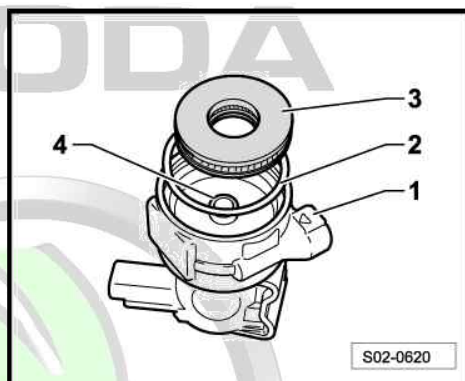


- Take out the paper filter -3-.



Note

- ◆ When removing as well as handling the filter housing -1-, ensure that the valve core -4- does not fall out of the filter housing.
- ◆ If the valve core has fallen out of the filter housing, pay attention to the correct fitting position when reinstalling.
- ◆ Fitting position of the valve core: The tensioning sleeve faces the valve, the rubber sealing-, and closing element faces the paper filter -3-.



Install

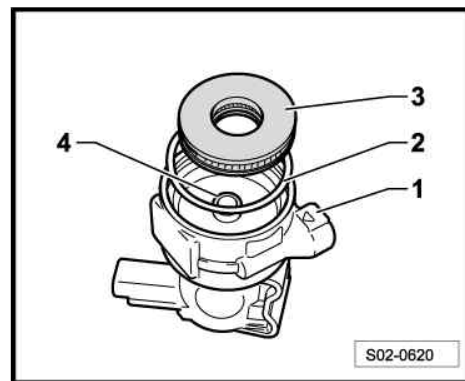
Installation is performed in the reverse order, pay attention to the following points:

- Check the gasket ring -2- in the filter housing -1-, replace where necessary.
- Insert the new paper filter -3- in the filter housing -1-.



Note

- ◆ *When installing as well as handling the filter housing -1-, ensure that the valve core -4- does not fall out of the filter housing.*
- ◆ *If the valve core has fallen out of the filter housing, pay attention to the correct fitting position when reinstalling.*
- ◆ *Fitting position of the valve core: The tensioning sleeve faces the valve, the rubber sealing-, and closing element faces the paper filter -3-.*



- Press the filter housing -3- into the flange -2- up to the stop in direction of arrow -B-.
- Secure the filter housing -3- with the circlip -1-.



Note

Make sure that the circlip safely locks in place in the slot of the filter housing.

- Tighten the evaporator with both screws.

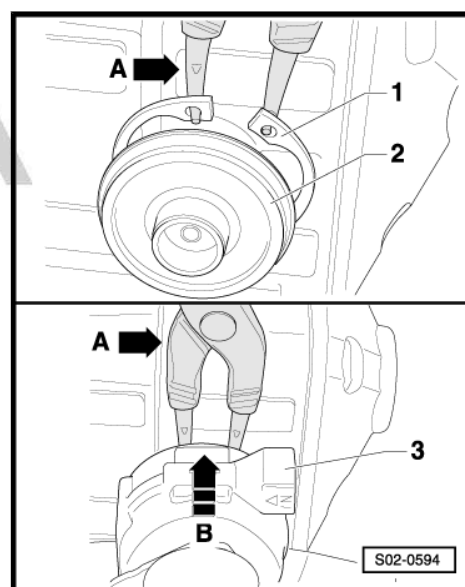
Tightening torque: 10 Nm

- Screw down the screwed connection of the gas line on the gas inlet of the filter housing.

Tightening torque: 10 Nm

- Connect the plug to the high-pressure valve for gas mode - N372- .

- Install battery tray ⇒ Electrical System; Rep. gr. 27 .





Note

On LPG vehicles (engine identification characters CHGA) spacer washers of 4 mm thickness are fitted between the battery tray and the body below the front screws -bottom arrows-.

For vehicles manufactured up to 12.2010 (exhaust emission standard EU-4)

- Install liquefied petroleum gas control unit
⇒ [“3.2 Removing and installing liquefied petroleum gas control unit \(for LPG vehicles\)”, page 199](#) .

Continued for all vehicles

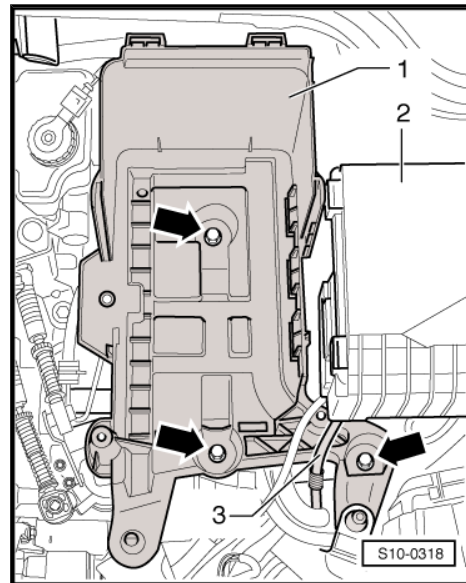
- Install battery ⇒ Electrical System; Rep. gr. 27 .
- Install air filter
⇒ [“1.4 Air filter with component parts - Summary of components”, page 177](#) .
- Fill up gas line
⇒ [“2.3 Emptying and filling up gas line”, page 144](#) .



Caution

Check the compressed natural gas system for leaks, e.g. with a gas leakage detector for natural gas vehicles - VAS 6227- .

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For vehicles manufactured up to 12.2010 (exhaust emission standard EU-4)

- Query and erase event memory of the LPG control unit
⇒ [“2.1 Connecting the diagnostic unit, querying and erasing the event memory of the liquefied petroleum gas system \(LPG\)”, page 3](#) .

For vehicles manufactured as of 01.2011 (exhaust emission standard EU-5)

- Querying and erasing event memory of engine control unit
⇒ Vehicle diagnostic tester.

Continued for all vehicles

- After assembly is complete, carry out a leak tightness test on the natural gas system ⇒ Maintenance ; Booklet Octavia II .

2.7.4 Removing and installing the evaporator with filter housing and high-pressure valve for gas mode - N372-

Special tools and workshop equipment required

- ◆ Catch pan , e.g. -VAS 6208-
- ◆ Hose clamps - T30096 (3093)-
- ◆ Pliers for spring strap clamps

Removing



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8 .

- Empty gas line
⇒ "2.3 Emptying and filling up gas line", page 144 .
- Remove air filter
⇒ "1.4 Air filter with component parts - Summary of components", page 177 .
- Remove battery ⇒ Electrical System; Rep. gr. 27 .

For vehicles manufactured up to 12.2010 (exhaust emission standard EU-4)

- Remove liquefied petroleum gas control unit
⇒ "3.2 Removing and installing liquefied petroleum gas control unit (for LPG vehicles)", page 199 .

Continued for all vehicles

- Remove battery tray ⇒ Electrical System; Rep. gr. 27 .



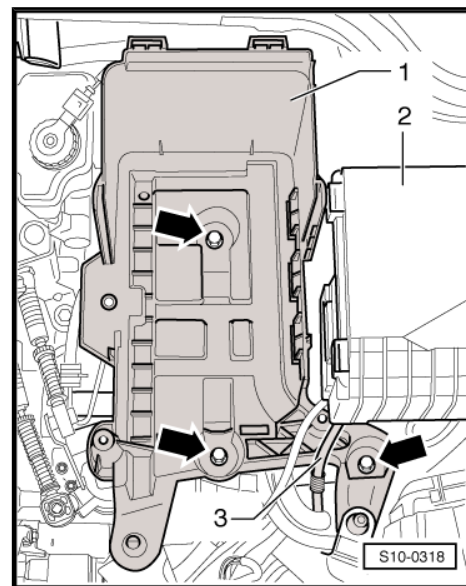
Note

On LPG vehicles (engine identification characters CHGA) spacer washers of 4 mm thickness are fitted between the battery tray and the body below the front screws -bottom arrows-.



WARNING

When loosening the gas line, gas may escape. Wear safety goggles and safety clothing, in order to avoid eye injuries and burns. Cover the connection points with a cloth and open carefully.





- Disconnect the plug -1- from the high-pressure valve for gas mode - N372- .
- Unscrew the screwed connection of the gas line from the gas inlet of the filter housing -3-.
- Unscrew the screws -4- and detach the vacuum hose from the released evaporator.
- Pinch off coolant hoses with hose clamps -T30096 (3093)- and detach hoses from evaporator.

Install



Note

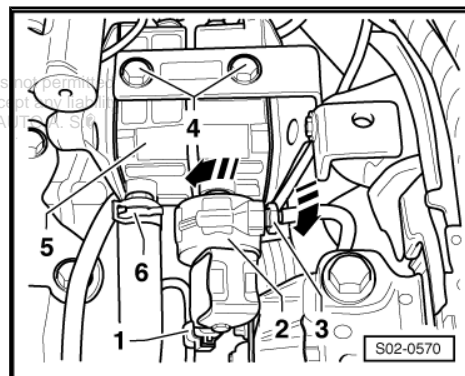
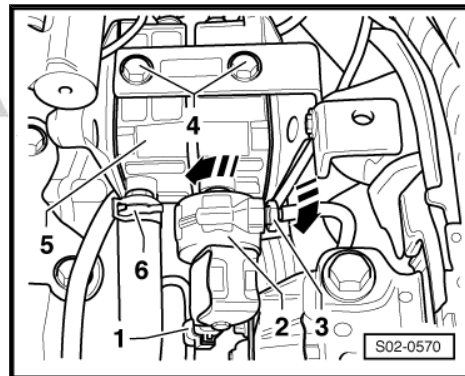
Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8 .

Installation is performed in the reverse order, pay attention to the following points:

Tightening torque of screws -4-: 10 Nm

Tightening torque, bolted connection of gas line -3-: 10 Nm





Note

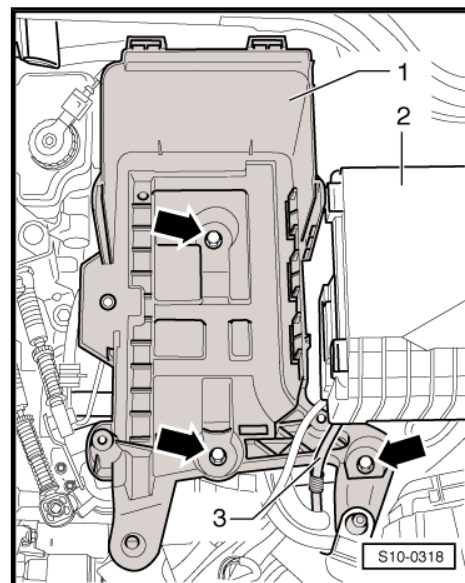
On LPG vehicles (engine identification characters CHGA) spacer washers of 4 mm thickness are fitted between the battery tray and the body below the front screws -bottom arrows-.

- Fill up gas line
⇒ [“2.3 Emptying and filling up gas line”, page 144](#) .
- Check the level of coolant and top up if necessary
⇒ [“1.7 Draining and filling up coolant”, page 105](#) .
- After filling the gas line, carry out a leak tightness test on the natural gas system ⇒ Maintenance ; Booklet Octavia II .



Caution

Check the compressed natural gas system for leaks, e.g. with a gas leakage detector for natural gas vehicles - VAS 6227- .



For vehicles with engine identification characters CHGA manufactured up to 12.2010 (emission level EU-4)

- Query and erase event memory of the LPG control unit
⇒ [“2.1 Connecting the diagnostic unit, querying and erasing the event memory of the liquefied petroleum gas system \(LPG\)”, page 3](#) .

For vehicles with engine identification characters CHGA manufactured from 01.2011 (emission level EU-5)

- Querying and erasing event memory of engine control unit
⇒ Vehicle diagnostic tester.



3 Activated charcoal filter system

⇒ ["3.1 Summary of components - activated charcoal filter", page 162](#)

⇒ ["3.2 Checking the fuel tank venting", page 163](#)

3.1 Summary of components - activated charcoal filter



Note

- ◆ The hose connections are secured with spring strap clips or clamp-type clips.
- ◆ Always replace clamp-type clips with spring-type clips.
- ◆ Use pliers for spring strap clips to fit the spring strap clips.
- ◆ Observe safety measures and rules of cleanliness when working on the fuel supply
⇒ ["2.3 Safety precautions and rules for cleanliness when working on petrol fuel supply system", page 10](#).

1 - Activated charcoal filter

- ☐ Fitting location: in right of engine compartment

2 - Pressure holding valve with connection hose

3 - Connecting hose

- ☐ check for firm seating
- ☐ from fuel tank

4 - Screw

- ☐ 10 Nm

5 - Activated charcoal filter system solenoid valve 1 -N80-

- ☐ When the ignition is switched off, the valve is closed
- ☐ When the engine has reached its operating temperature, the valve is actuated by the engine control unit (pulsed)

6 - Connecting hose

- ☐ To intake manifold
- ☐ check for firm seating

7 - Support

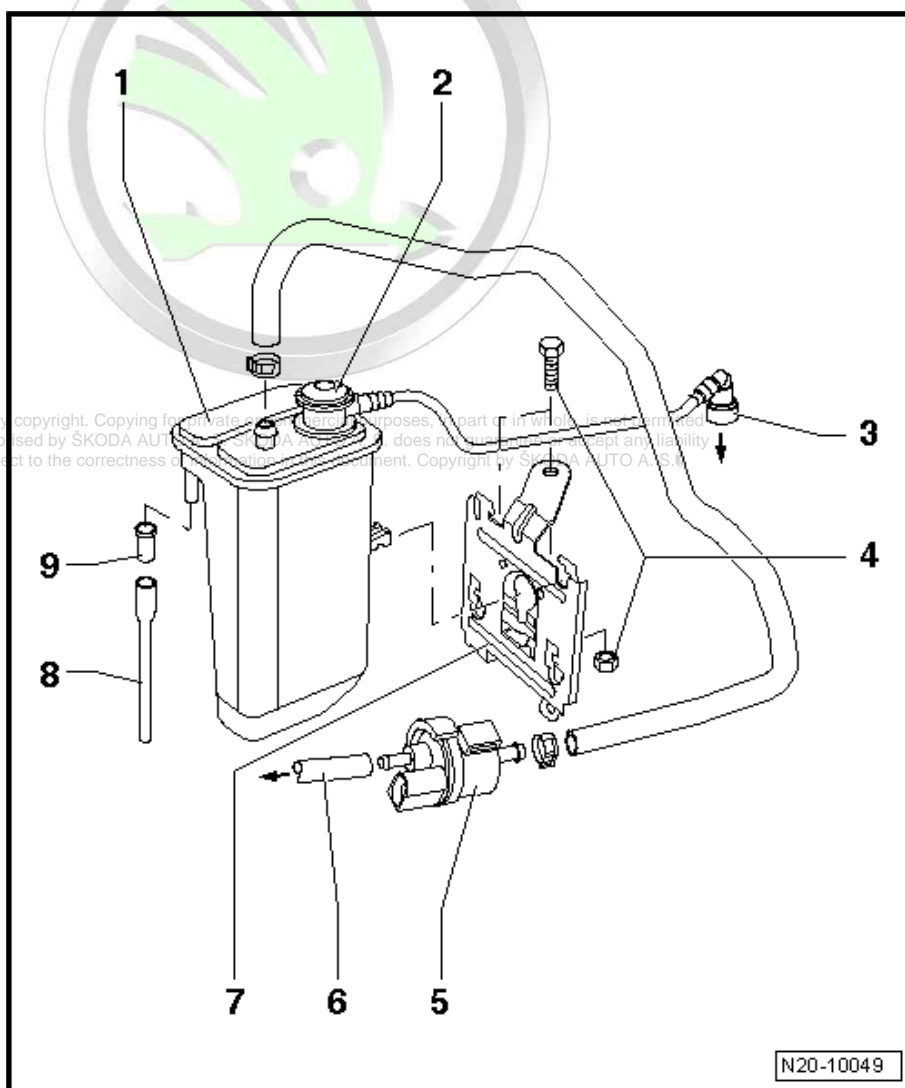
- ☐ for activated charcoal filter

8 - Air admission hose

- ☐ installed up to 10.2004

9 - Grommet

- ☐ installed up to 10.2004



3.2 Checking the fuel tank venting

Special tools and workshop equipment required

- ◆ Vacuum tester , e. g. -V.A.G. 1368-
- ◆ Hand vacuum pump , e.g. -V.A.S. 6213- or -V.A.G. 1368-



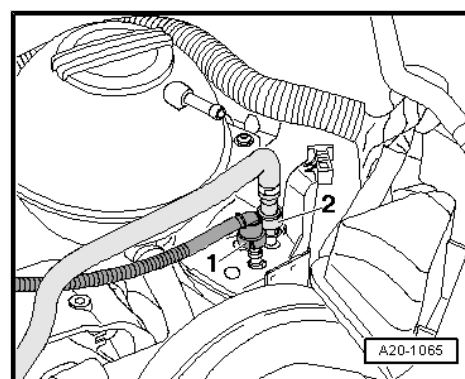
Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8 .

Test condition

- The ignition must be switched off.
- Detach vent line -1-
⇒ "4 Separating push-on couplings", page 164 .



- Connect hand vacuum pump -V.A.S. 6213- or -V.A.G. 1368- -1- and vacuum tester to vent line as shown.
- Move vacuum tester into position - A/B -.
- Operate the hand vacuum pump several times. No vacuum should build up.

If a vacuum builds up:

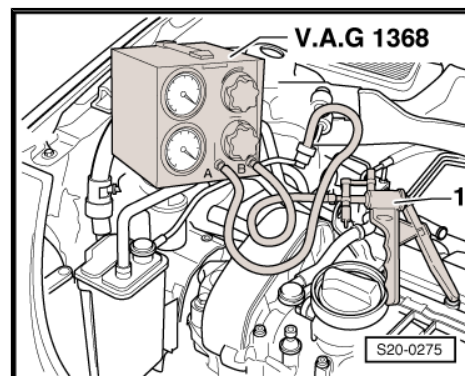
- Check breather hose -Position 8-
⇒ "3.1 Summary of components - activated charcoal filter", page 162 on activated charcoal filter for dirt and clean if necessary.

If no vacuum builds up:

- Shut off breather hose -Position 8-
⇒ "3.1 Summary of components - activated charcoal filter", page 162 and operate the hand vacuum pump several times. A vacuum should build up.

If no vacuum builds up:

- Replace activated charcoal filter.





4 Separating push-on couplings

Special tools and workshop equipment required

- ◆ Lever - T10468-



Note

- ◆ The quick couplings of fuel, vacuum and ventilation lines are colour marked. Either the colour point at the quick coupling or the release button has the corresponding colour.
- ◆ Observe safety measures and rules for cleanliness
⇒ "2.3 Safety precautions and rules for cleanliness when working on petrol fuel supply system", page 10.

Push-on coupling	Colour coding on the quick coupling
Fuel feed line	Black
Fuel return-flow line	Blue
Vent line	White, beige
Vacuum line	green



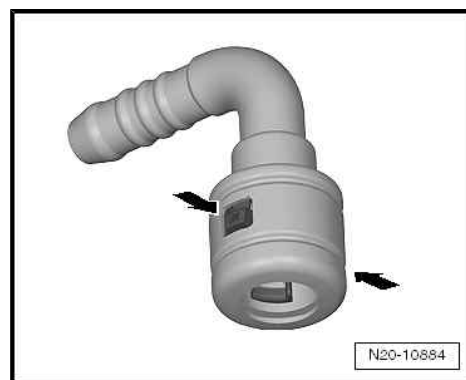
WARNING

Fuel supply line is pressurised! Wear safety goggles and safety clothing, in order to avoid injuries and skin contact with fuel. Place cleaning cloths around the connection point before detaching hose connections. Reduce pressure by carefully removing the hose.

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Variant 1

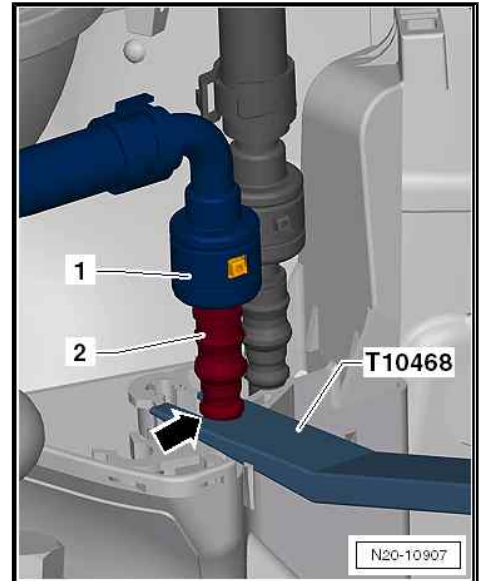
Quick coupling with release buttons -arrows- on right and left.



The separation point -1- in the engine compartment must be held in place.

- Insert the lever - T10468- between the heat shield and the stop -arrow- of the fuel line -2- and hold.

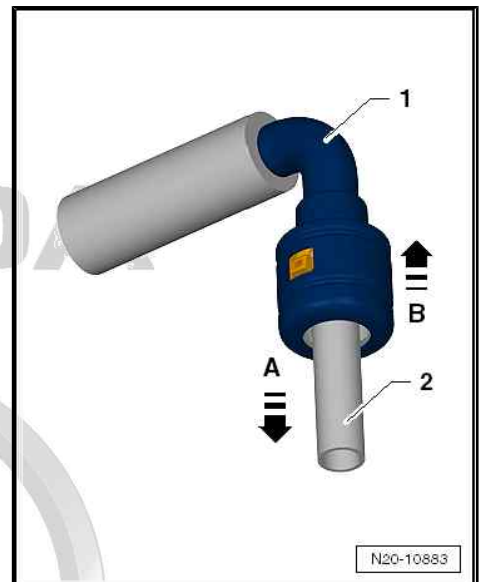
Continued for all separation points.



- Press the quick coupling -1- in direction of arrow -A-.
- Press the release buttons and remove the quick coupling -1- from the fuel line -2- in direction of the arrow -B-.

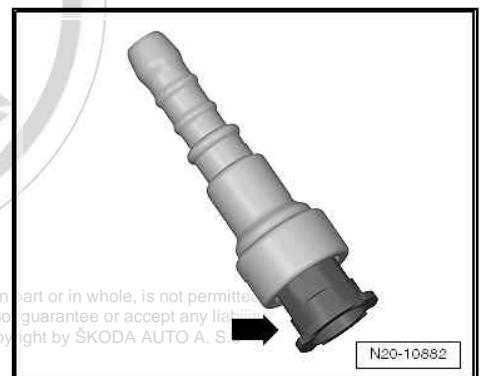
Pay attention to the assignment of the colours when installing
⇒ [page 164](#) .

- Check the quick coupling for firm seating by pulling in the opposite direction!



Variant 2

Quick coupling with pull release -arrow-.

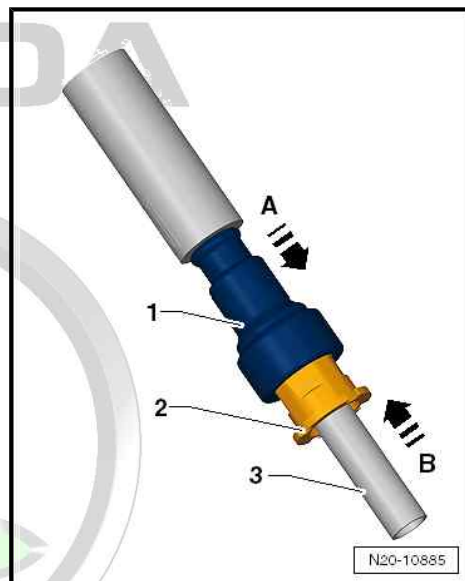


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- Press the quick coupling -1- in direction of arrow -A-.
- Pull pull-release mechanism -2- in direction of arrow -B-.
- Remove the quick coupling -1- from the fuel line -3- in direction of the arrow -B-.

Pay attention to the assignment of the colours when installing
⇒ [page 164](#) .

- Check the quick coupling for firm seating by pulling in the opposite direction!



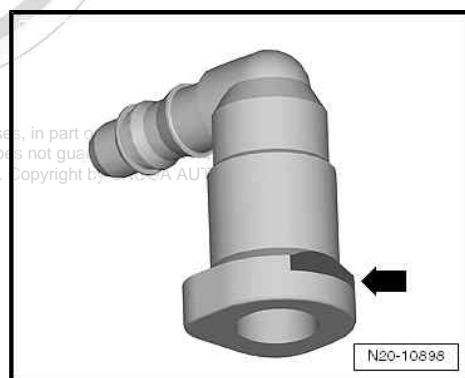
Variant 3

Quick coupling with front button -arrow-.

- Press the release button -arrow- and detach the quick coupling.

Pay attention to the assignment of the colours when installing
⇒ [page 164](#) .

- Check the quick coupling for firm seating by pulling in the opposite direction!



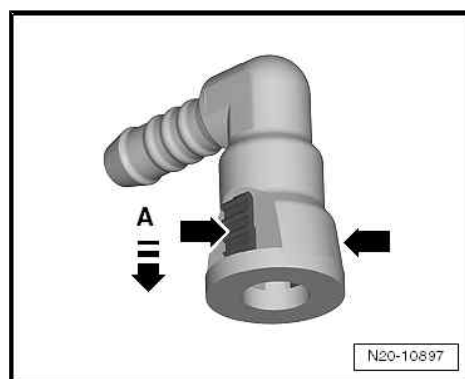
Variant 4

Quick coupling with release buttons arrows -- on right and left.

- Press the quick coupling in direction of arrow -A-.
- Press release buttons arrows -- and detach quick coupling.

Pay attention to the assignment of the colours when installing
⇒ [page 164](#) .

- Check the quick coupling for firm seating by pulling in the opposite direction!



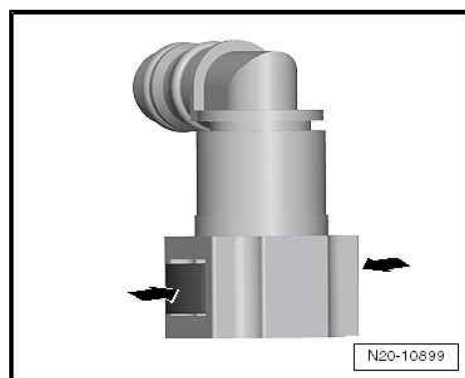
Variant 5

Quick coupling with release buttons -arrows- on right and left.

- Press release buttons -arrow- and detach quick coupling.

Pay attention to the assignment of the colours when installing
⇒ [page 164](#) .

- Check the quick coupling for firm seating by pulling in the opposite direction!



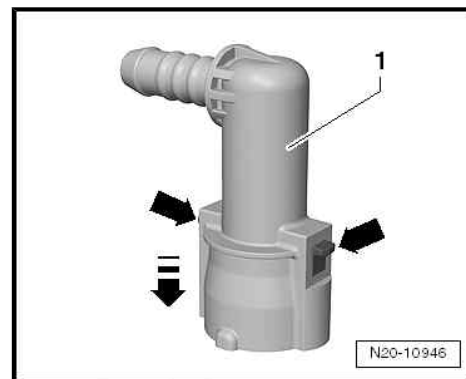
Variant 6

Quick coupling with release buttons -arrows- on right and left.

- Press push-on coupling -1- in -direction of arrow- and hold pressed.
- Press release buttons -arrow- and detach quick coupling.

Pay attention to the assignment of the colours when installing
⇒ [page 164](#) .

- Check the quick couplings for firm seating by pulling in the opposite direction!



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5 Assembly overview - accelerator module

1 - Connector

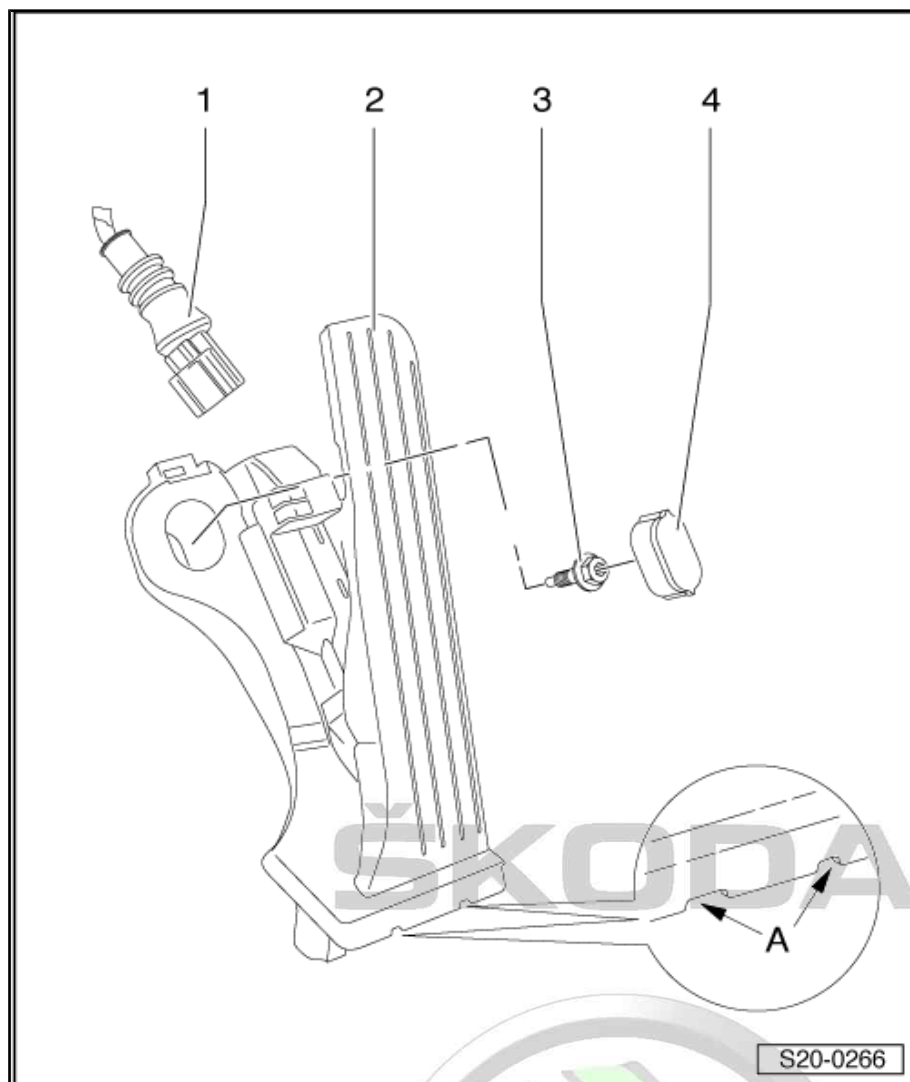
2 - Accelerator pedal position sender - G79- with accelerator pedal position sender 2 - G185-

- ☐ -A- openings for the release tool
- ☐ removing and installing
⇒ ["5.1 Removing and installing accelerator pedal module", page 168](#)
- ☐ when replacing, the engine control unit must be adapted on vehicles with automatic gearbox
⇒ Vehicle diagnostic tester

3 - Screw

- ☐ 10 Nm

4 - Protective cap



5.1 Removing and installing accelerator pedal module

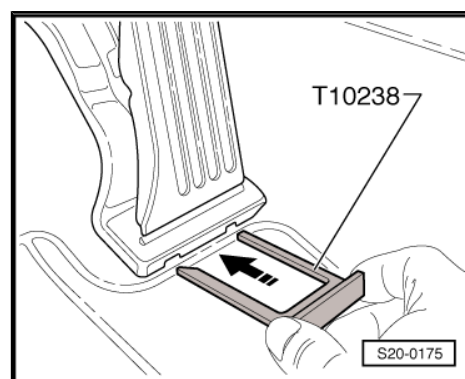
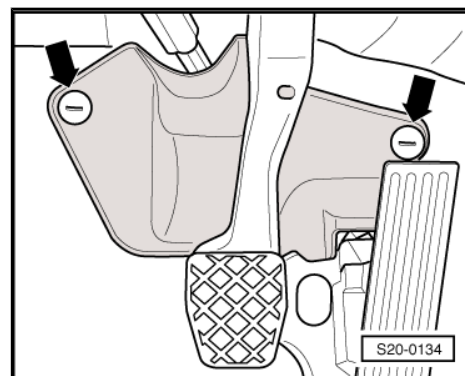
Special tools and workshop equipment required

- ◆ Release tool - T10238- (for left-hand drive vehicle)
- ◆ Release tool - T10240- (for right-hand drive vehicle)

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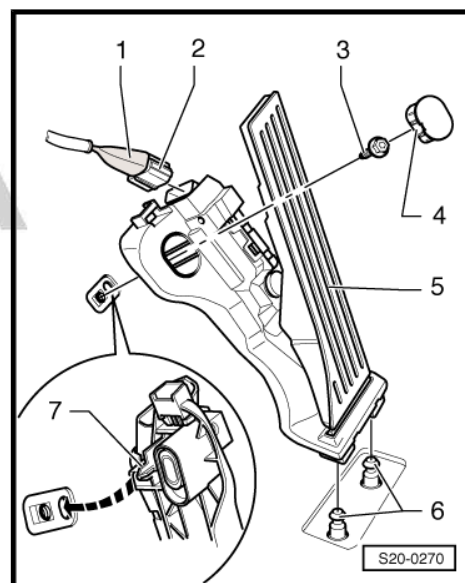
Removing

- Remove cover for the steering column -arrows-.
- Lever out the cap Pos. -4- with a screwdriver
⇒ [“5 Assembly overview - accelerator module”, page 168](#) .
- Unscrew fixing screw Pos. -3-
⇒ [“5 Assembly overview - accelerator module”, page 168](#) .
- Push the release tool - T10238 - (on right-hand drive vehicles release tool - T10240 -) up to the stop into the provided openings -arrow- and remove the accelerator pedal module.
- Disconnect connector at accelerator pedal module
⇒ [“5.1.1 Disconnect connector for accelerator pedal module and fit on”, page 170](#) .



Install

- Fit the plug -2- onto the accelerator pedal module -5-
⇒ [“5.1.1 Disconnect connector for accelerator pedal module and fit on”, page 170](#) .
- The plug must lock audibly.
- Push accelerator pedal module onto the fixing bolts -6-.
- Insert the centering pin -7- into the hole in the underbody.
- Fasten accelerator pedal module with screw -3- (10 Nm) and fit on cap -4-.
- Reinstall cover for the steering column.
- If the accelerator pedal module was replaced, an adaptation of the engine control unit has to be performed on vehicles with automatic gearbox ⇒ Vehicle diagnostic tester.



5.1.1 Disconnect connector for accelerator pedal module and fit on



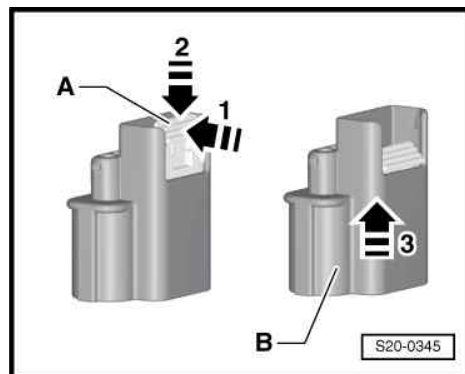
Note

The plugs for the accelerator pedal module which are inserted, must be disconnected and fit on in a different manner.

Disconnect connector 1K0 973 706

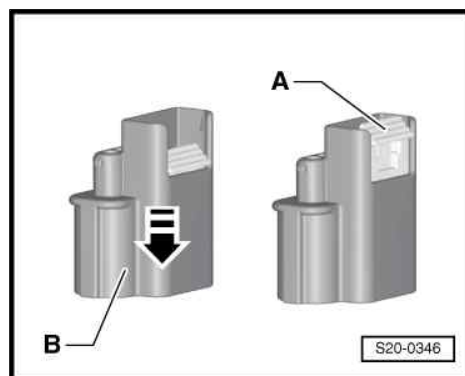
- Slightly press the piston slide valve -A- (grey) in direction of arrow -1- and push it up to the stop in direction of arrow -2-.
- Hold the piston slide valve in this position and disconnect the socket housing -B- towards the top in direction of arrow -3-.

The piston slide valve -A- remains in the bottom position.



Fit on connector 1K0 973 706

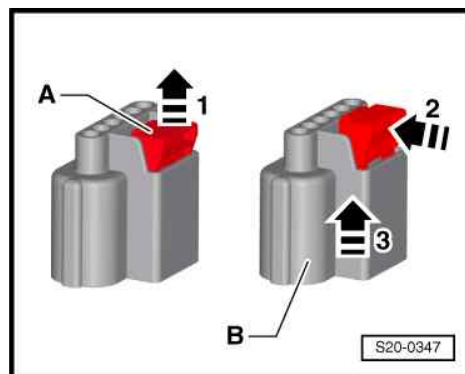
- Push the socket housing -B- down in -direction of arrow- until the housing can be heard to lock in place.
- The piston slide valve -A- moves automatically upwards.
- For safety reasons, check the connector for secure catch by tightening it in the opposite direction.



Disconnect connector 8K0 973 706

- Pull piston slide valve -A- (red) upwards in direction of arrow -1- up to the stop.
- Press the piston slide valve in direction of arrow -2- and disconnect the socket housing -B- upwards in direction of arrow -3-.

The piston slide valve -A- remains in the top position.

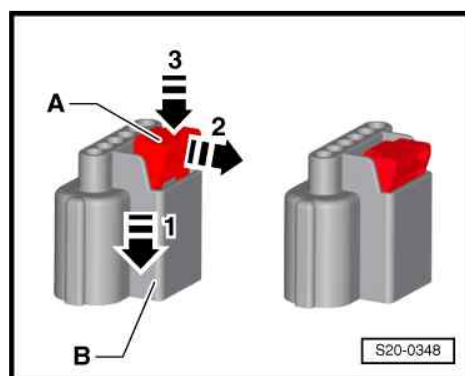


Fit on connector 8K0 973 706

- Push the socket housing -B- down in direction of arrow -1- up to the stop.
- Slightly push the piston slide valve in -direction of arrow 2- and slide it downwards in -direction of arrow 3-.

The piston slide valve -A- can only be pushed down if the socket housing was pushed »up to the stop«.

- For safety reasons, check the connector for secure catch by tightening it in the opposite direction.



24 – Mixture preparation - injection

1 Repairing fuel injection

⇒ [“1.1 Installation location overview”, page 171](#)

⇒ [“1.2 Assembly overview - intake manifold”, page 175](#)

⇒ [“1.3 Fuel strip - Summary of components”, page 176](#)

⇒ [“1.4 Air filter with component parts - Summary of components”, page 177](#)

⇒ [“1.5 Removing and installing bottom part of intake manifold”, page 177](#)

⇒ [“1.6 Clean throttle valve control unit J338”, page 181](#)

⇒ [“1.7 Completely removing and installing the intake manifold”, page 182](#)

⇒ [“1.8 Gas distribution line \(for LPG vehicles\) - Summary of components”, page 186](#)

⇒ [“1.9 Removing and installing gas distribution line \(for LPG vehicles\)”, page 187](#)

⇒ [“1.10 Removing and installing gas inlet valves \(for LPG vehicles\)”, page 188](#)

1.1 Installation location overview

The components marked with A, B, C and D are not shown in the fig.

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A - Brake pedal switch -F47- or brake light switch -F-

- ☐ together in one housing, in the footwell

B - Accelerator pedal position sender -G79- and -G185-

- ☐ in footwell on the accelerator pedal
⇒ ["5 Assembly overview - accelerator module", page 168](#)

C - Camshaft position sensor -G163-

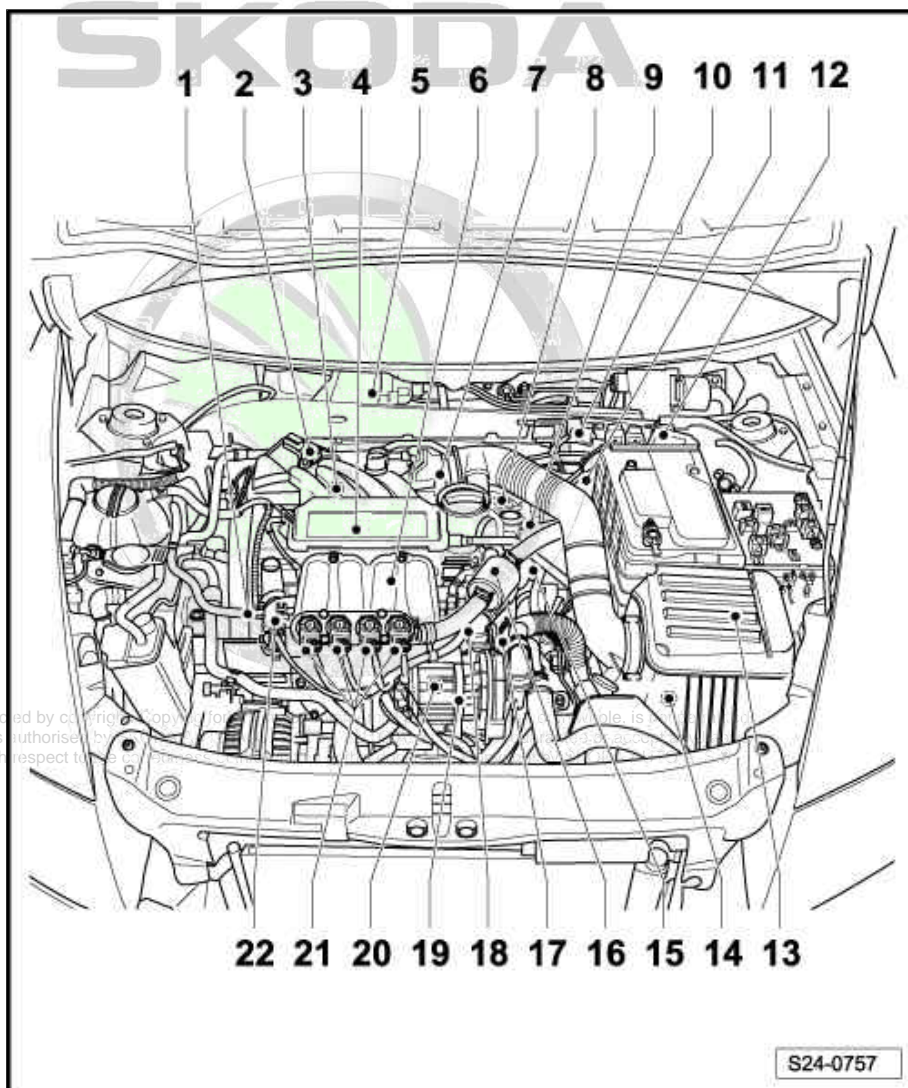
- ☐ at rear of cylinder head

D - Lambda probe downstream of catalytic converter -G130- , 50 Nm

- ☐ Fitting location: in the exhaust pipe
- ☐ only coat thread with hot screw paste "G 052 112 A3"; hot screw paste must not get into the slot of the probe body.
- ☐ use lambda probe wrench for removing and installing

1 - Fuel feed line

- ☐ secure with hose



clamps

2 - Intake manifold pressure sender -G71- with intake air temperature sender -G42-

3 - Lambda probe upstream of catalytic converter -G39- , 50 Nm

- ☐ only coat thread with hot screw paste "G 052 112 A3"; hot screw paste must not get into the slot of the probe body.
- ☐ use lambda probe wrench for removing and installing

4 - Top part of intake manifold

5 - Engine control unit -J361-

- ☐ Fitting location: in plenum chamber

6 - Bottom part of intake manifold

- ☐ removing and installing ⇒ ["1.2 Assembly overview - intake manifold", page 175](#)

7 - Throttle valve control unit -J338 -

8 - Exhaust gas return valve -N18-

- ☐ with EGR potentiometer -G212-
- ☐ only for vehicles with engine identification characters BGU

9 - Coolant temperature sender -G62-

- ☐ before removing, reduce pressure in cooling system if necessary

10 - plug connection for lambda probe upstream of catalytic converter -G39-

11 - Evaporator (LPG)

- ☐ only for vehicles with engine identification characters CHGA
- ☐ removing and installing
⇒ ["2.7.4 Removing and installing the evaporator with filter housing and high-pressure valve for gas mode N372 ", page 158](#)
- ☐ with integrated filter and high-pressure valve for gas mode - N372-
- ☐ Replace filter ⇒ ["2.7.3 Replacing the filter on the evaporator", page 155](#)

12 - Liquefied petroleum gas control unit (LPG)

- ☐ only for vehicles with engine identification characters CHGA manufactured up to 12.2010 (exhaust emission standard EU-4)
- ☐ The liquefied petroleum gas control unit is located in the area of the battery
- ☐ removing and installing
⇒ ["3.2.1 For vehicles manufactured up to 12.2010 \(exhaust emission standard EU-4\)", page 199](#)

13 - Air filter

- ☐ disassembling and assembling
⇒ ["1.4 Air filter with component parts - Summary of components", page 177](#)

14 - Liquefied petroleum gas control unit (LPG)

- ☐ only for vehicles with engine identification characters CHGA manufactured as of 01.2011 (exhaust emission standard EU-5)
- ☐ The liquefied petroleum gas control unit is located under the front right frame side rail
- ☐ removing and installing
⇒ ["3.2.2 For vehicles manufactured as of 01.2011 \(exhaust emission standard EU-5\)", page 200](#)



Note

For vehicles manufactured as of 01.2011 (exhaust emission standard EU-5), the liquefied petroleum gas control unit (LPG) is not self-diagnostic. The petrol engine control unit -J361- controls and manages all the functions of the LPG system (including the event memory). The liquefied petroleum gas control unit (LPG) must only be activated in the "Gateway" for the data update, afterwards the control unit must be deactivated again!

15 - Engine speed sender -G28-

- ☐ Resistance: 730...1000 Ω

16 - Gas filter (LPG) - assembled up to 09.2012

- ☐ from 09.2012, the new gas filter is located on the bulkhead plenum chamber
⇒ ["2.7.2 Removing and installing gas filter - from 09.2012", page 154](#)
- ☐ only for vehicles with engine identification characters CHGA
- ☐ removing and installing ⇒ ["2.7 Removing and installing gas filter", page 153](#)

17 - Ignition transformer -N152-

- ☐ with identification for ignition leads, do not switch

18 - Injection valves -N30...N33-

- ☐ Resistance: 12...17 Ω (at approx. 20 °C)

19 - Secondary air pump motor -V101-

- ☐ Secondary air system
⇒ ["3.1 Secondary air system for engines with identification characters BGU, BSE, CCSA, CHGA - Summary of components", page 213](#)
- ☐ only for vehicles with engine identification characters BGU, BSE, CCSA and CHGA, CMXA

20 - Knock sensor 1 -G61-

- ☐ contacts gold-plated

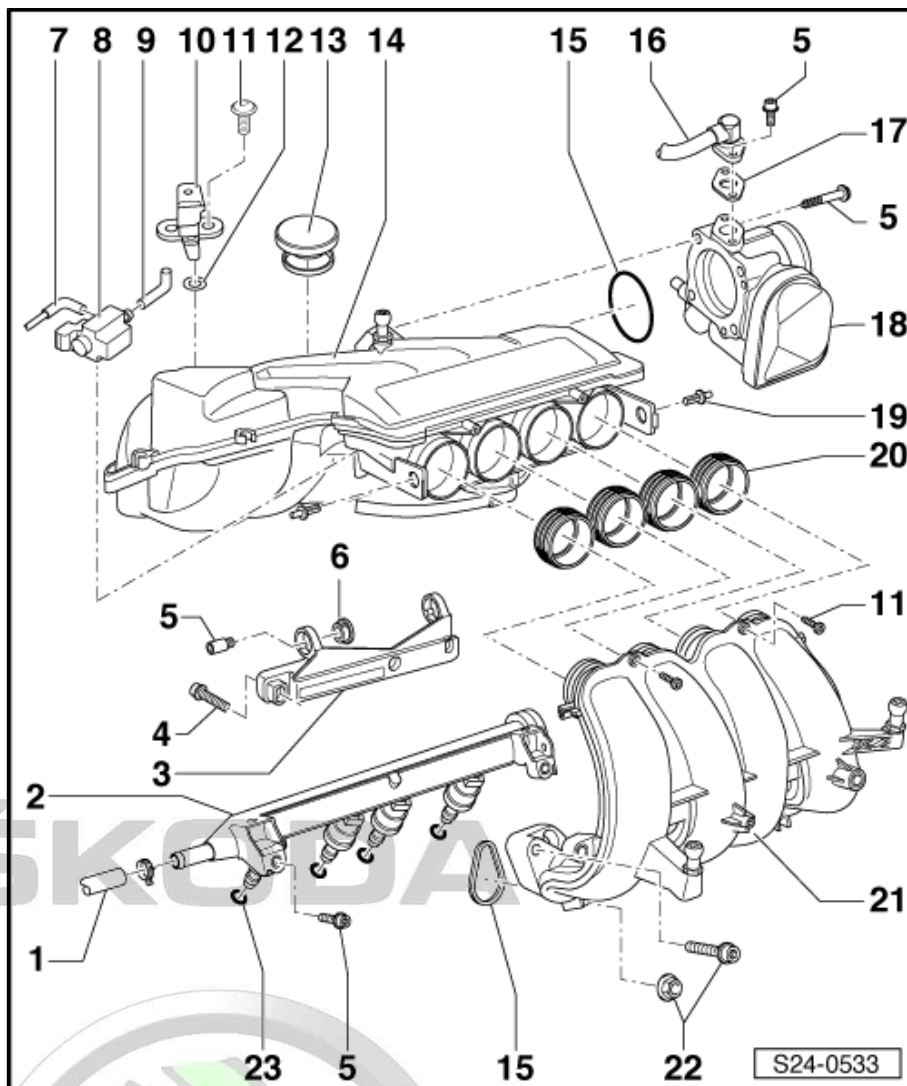
21 - Gas distribution line (LPG)

- ☐ only for vehicles with engine identification characters CHGA
- ☐ Gas inlet valve - N366-
- ☐ Gas inlet valve - N367-
- ☐ Gas inlet valve - N368-
- ☐ Gas inlet valve - N369-
- ☐ Remove and install gas distribution line
⇒ ["1.9 Removing and installing gas distribution line \(for LPG vehicles\)", page 187](#)
- ☐ Replace gas inlet valves
⇒ ["1.10 Removing and installing gas inlet valves \(for LPG vehicles\)", page 188](#)

22 - Gas distribution line sensor - G401-

1.2 Assembly overview - intake manifold

- 1 - Fuel feed line
- 2 - Fuel distributor
 - ☐ with injection valves
- 3 - Support
 - ☐ for the intake manifold
- 4 - 23 Nm
- 5 - 10 Nm
 - ☐ is mounted in the engines with identification characters BGU
- 6 - Rubber bearing
- 7 - Vacuum hose
 - ☐ to the vacuum setting element
- 8 - Valve for variable intake manifold changeover - N156-
- 9 - Vacuum hose
 - ☐ to vacuum reservoir in the intake manifold
- 10 - Intake manifold pressure sender -G71- with intake air temperature sender -G42-
- 11 - 3 Nm
- 12 - O-ring
 - ☐ replace if damaged
- 13 - Pressure relief valve
 - ☐ protects intake manifold from damage if excess pressure exists
 - ☐ only for vehicles with engine identification characters BGU
- 14 - Top part of intake manifold
 - ☐ removing and installing ➔ ["1.7 Completely removing and installing the intake manifold", page 182](#)
- 15 - Sealing ring
 - ☐ replace
- 16 - Pipe for exhaust gas recirculation
 - ☐ is mounted in the engines with identification characters BGU
- 17 - Gasket
 - ☐ replace
 - ☐ is mounted in the engines with identification characters BGU
- 18 - Throttle valve control unit -J338-
 - ☐ with throttle valve drive (electronic power control) -G186- , angle sensor 1 for throttle valve drive (electronic power control) -G187- and angle sensor 2 for throttle valve drive (electronic power control) -G188-
- 19 - Expanding rivet
- 20 - Sealing ring
 - ☐ replace if damaged





21 - Bottom part of intake manifold

- ☐ removing and installing ⇒ [“1.5 Removing and installing bottom part of intake manifold”, page 177](#)

22 - 20 Nm

23 - O-ring

- ☐ for injection valves
- ☐ replace
- ☐ moisten with clean engine oil

1.3 Fuel strip - Summary of components

1 - Fuel distributor

2 - Protective cap

3 - Retaining clip

- ☐ check tightness on the injection valve and fuel distributor

4 - O-ring

- ☐ replace
- ☐ moisten with clean engine oil

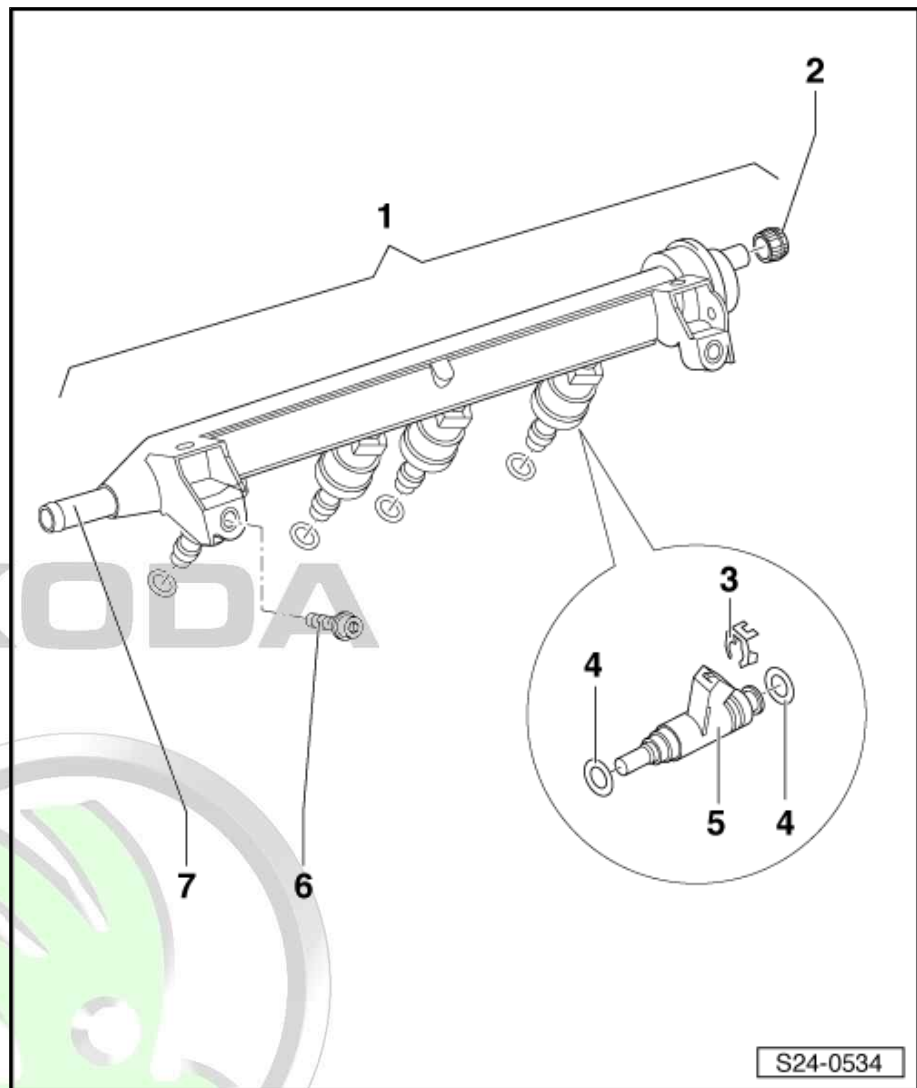
5 - Injection valves -N30...N33-

- ☐ Inspect the injection rate, tightness and jet formation of the injection valves
⇒ [“2.1 Checking the tightness and injection rate of the injection valves”, page 190](#)

6 - 10 Nm

7 - Fuel feed line

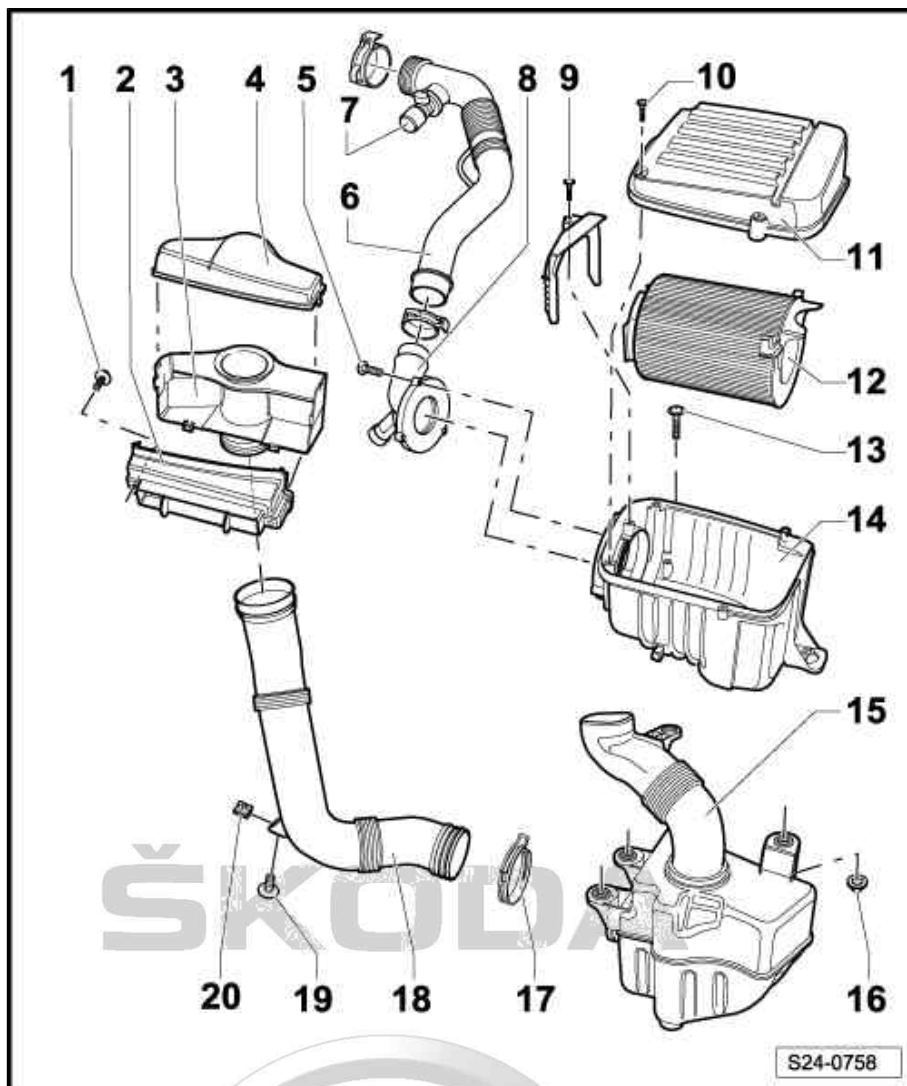
- ☐ secure with spring strap clamps
- ☐ from fuel filter



S24-0534

1.4 Air filter with component parts - Summary of components

- 1 - 5 Nm
- 2 - Air guide duct
 - ☐ to bumper
- 3 - Air catcher
 - ☐ to bumper
- 4 - Air catcher cover
- 5 - 2 Nm
- 6 - Air intake hose
 - ☐ with valve for crankcase ventilation
- 7 - Crankcase ventilation connection
 - ☐ for cold countries with heating resistor
- 8 - Air deflector
- 9 - 2 Nm
- 10 - 3 Nm
- 11 - Air filter cover
- 12 - Filter element
- 13 - 8 Nm
- 14 - Air filter housing
- 15 - Container with pre-cubic contents
- 16 - 20 Nm
- 17 - Spring strap clamp
- 18 - Intake air duct
- 19 - 2 Nm
- 20 - Plate nut



1.5 Removing and installing bottom part of intake manifold



Note

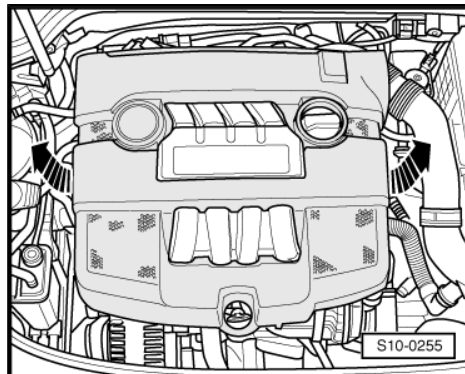
- ◆ *Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)*
⇒ ["2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)", page 8](#).
- ◆ *Observe safety measures and rules of cleanliness when working on the fuel supply (petrol)*
⇒ ["2.3 Safety precautions and rules for cleanliness when working on petrol fuel supply system", page 10](#).
- ◆ *The fuel lines remain connected.*

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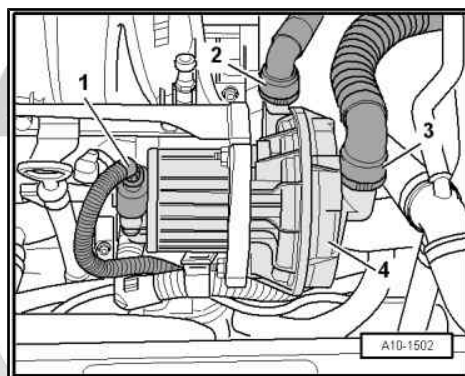


Removing

- Switch off ignition and withdraw ignition key.
- If present, remove engine cover -arrows-.



- Unplug connector -1- from secondary air pump motor -V101- .
- Detach pressure hose -2- and intake hose -3- from secondary air pump motor -V101- .



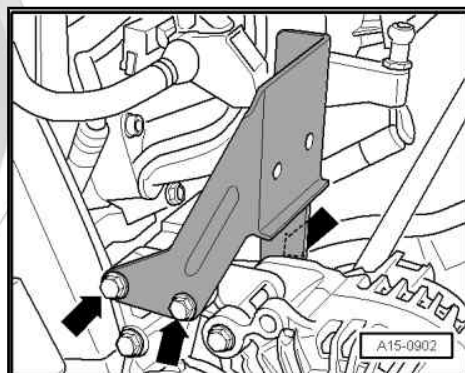
- Remove bracket -arrows-.
- Remove oil dipstick guide from bracket for secondary air pump -V101- .

For vehicles with engine identification characters CHGA



WARNING

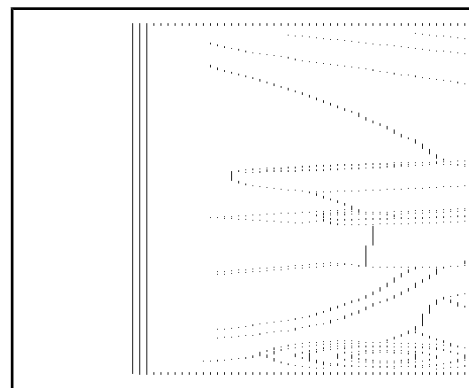
When loosening the gas line, gas may escape. Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding. Cover the connection point with a cloth and separate carefully.



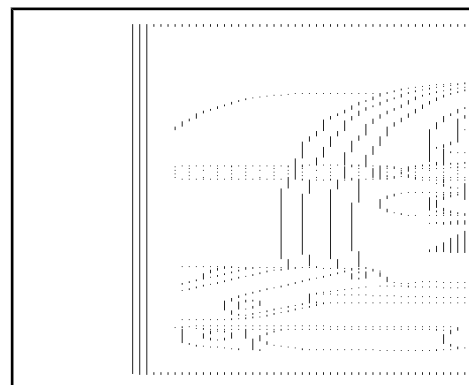
- Remove gas distribution line
⇒ ["1.9 Removing and installing gas distribution line \(for LPG vehicles\)", page 187](#) .
- Remove the bracket for the gas distribution line.

Continued for all vehicles

- Remove bracket with secondary air pump motor -V101- from intake manifold -arrows-.

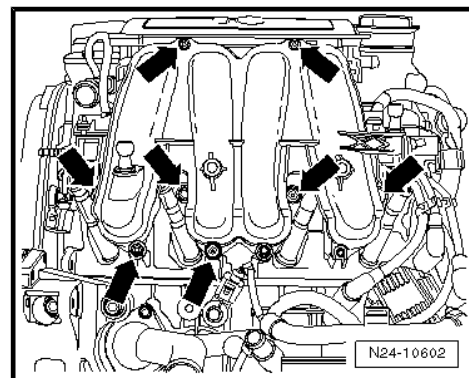


- Unscrew screws for petrol fuel distributor and expose wiring loom -arrows-.



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- Unscrew screws -arrows- for bottom part of intake manifold.
- Press both catch pegs on the top part of the intake manifold towards each other and pull out the bottom part of the intake manifold towards the front.



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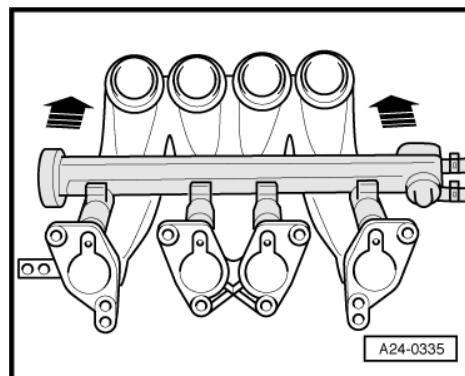


- Slacken the fuel distributor and evenly detach it together with the injection valves from the bottom part of the intake manifold -arrows- and place it on a clean cloth in the engine compartment.

Install

Installation is carried out in the reverse order. Pay attention to the following:

- Replace gasket rings between intake manifold and cylinder head.
- Replace gasket rings between injection valves and intake manifold and moisten lightly with clean engine oil.
- Fit on the petrol fuel distributor with the injection valves and press down evenly on the intake manifold.
- Pay attention to the correct position of the gasket rings between the bottom part and the top part of the intake manifold.



Note

Secure all hose connections with corresponding hose clips.

Tightening torques

Component	Nm
Intake manifold to cylinder head	25
Connecting screws of top part/bottom part of intake manifold	3
Petrol fuel distributor to intake manifold	8

For vehicles with engine identification characters CHGA manufactured up to 12.2010 (emission level EU-4)

- Query and erase event memory of the LPG control unit
⇒ “2.1 Connecting the diagnostic unit, querying and erasing the event memory of the liquefied petroleum gas system (LPG)”, page 3 .

For vehicles with engine identification characters CHGA manufactured from 01.2011 (emission level EU-5)

- Querying and erasing event memory of engine control unit
⇒ Vehicle diagnostic tester.

For vehicles with engine identification characters CHGA

- After filling the gas line, carry out a leak tightness test on the natural gas system ⇒ Maintenance ; Booklet Octavia II .



Caution

Check the compressed natural gas system for leaks, e.g. with a gas leakage detector for natural gas vehicles - VAS 6227- .

1.6 Clean throttle valve control unit - J338-



Note

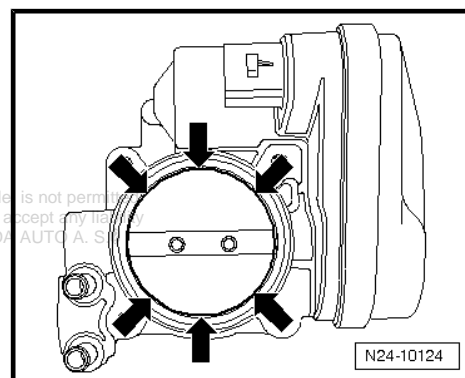
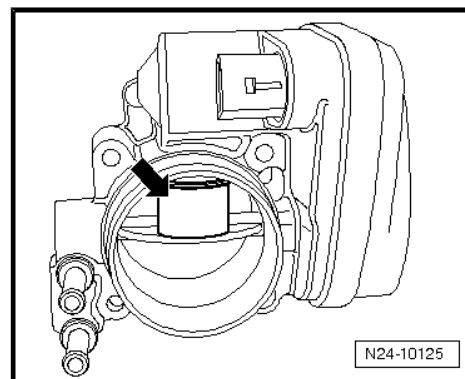
- ◆ *Observe safety measures and rules of cleanliness when working on the fuel supply*
⇒ *"2.3 Safety precautions and rules for cleanliness when working on petrol fuel supply system", page 10* .
 - ◆ *If a new engine control unit - J623- is installed the throttle flap module must be adjusted. The adaptation must only be carried out with a new or cleaned throttle valve control unit, because dirt/carbon deposits in the end stop of the throttle valve can lead to incorrect adaptation values.*
 - ◆ *The throttle valve support must not be scratched when cleaning.*
- Remove throttle valve control unit - J338- .
 - Open the throttle valve manually and block the throttle valve in the opened position with a suitable object (e.g. plastic or wooden wedge)-arrow-.



WARNING

Acetone is easily inflammable. Observe accident prevention regulations and safety notes when handling highly inflammable fluids. Do not use compressed air when cleaning the throttle valve. Wear safety goggles and safety clothing, in order to avoid injuries and skin contact with fuel.

- Thoroughly clean the throttle valve support, in particular the area of the closed throttle valve -arrows-, with commercially available acetone and a paint brush.
- Wipe the throttle valve support with a non-fluffy cloth.
- Let the acetone dry off completely and re-install the cleaned throttle valve control unit.





1.7 Completely removing and installing the intake manifold



Note

- ♦ *Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)*
⇒ *"2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8*.
- ♦ *Observe safety measures and rules of cleanliness when working on the fuel supply (petrol)*
⇒ *"2.3 Safety precautions and rules for cleanliness when working on petrol fuel supply system", page 10*.

Removing

- Switch off ignition and withdraw ignition key.
- If present, remove engine cover -arrows-.

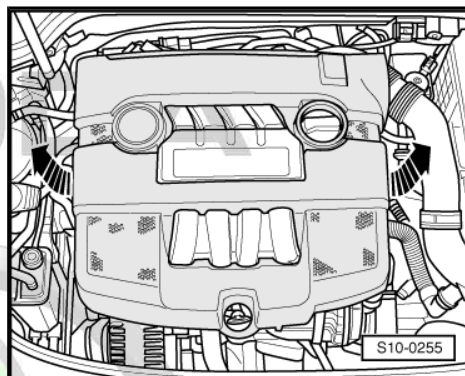
For vehicles with engine identification characters CHGA

- Empty gas line
⇒ *"2.3 Emptying and filling up gas line", page 144*.



WARNING

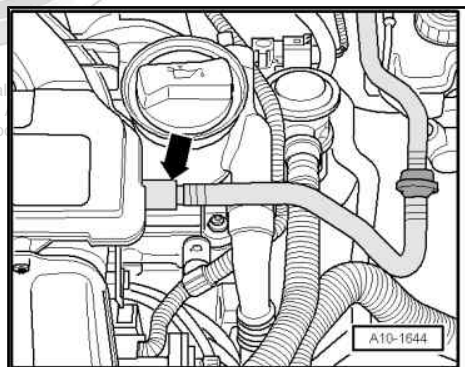
When loosening the gas line, gas may escape. Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding. Cover the connection point with a cloth and separate carefully.



- Remove gas distribution line
⇒ *"1.9 Removing and installing gas distribution line (for LPG vehicles)", page 187*.
- Remove the bracket for the gas distribution line.

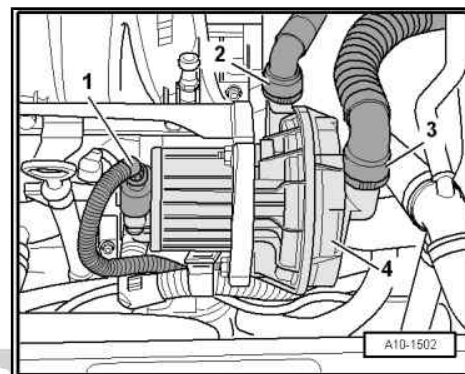
Continued for all vehicles

- Remove intake air hose between throttle valve control unit - J338- and air filter.
- Detach the vacuum line to the brake servo unit -arrow- from the intake manifold.

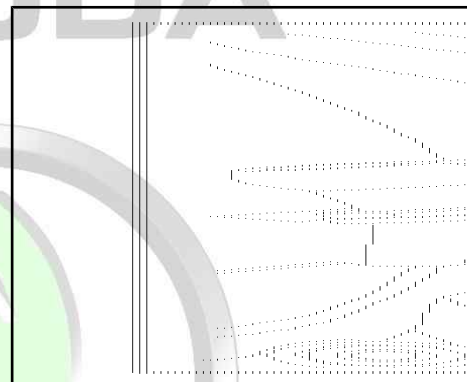


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- Unplug connector -1- from secondary air pump motor -V101- .
- Detach pressure hose -2- and intake hose -3- from secondary air pump motor -V101- .
- Remove oil dipstick from bracket for secondary air pump - V101- .



- Remove bracket with secondary air pump motor -V101- from intake manifold -arrows-.

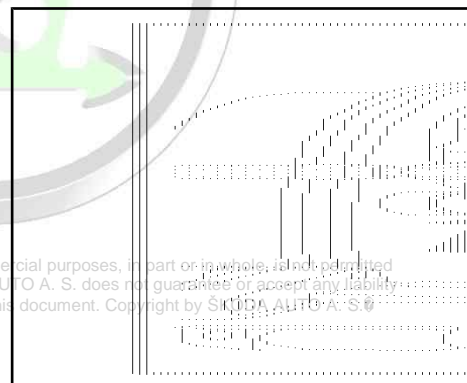


- Unscrew screws for petrol fuel distributor and expose wiring loom -arrows-.

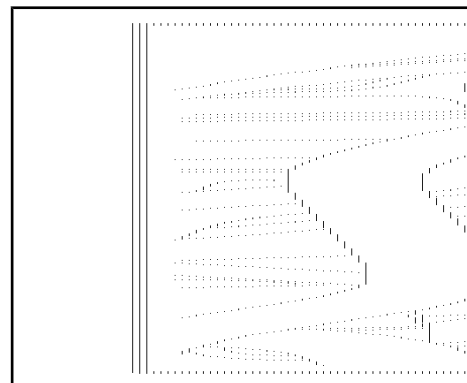


Note

The fuel line can remain attached to the fuel distributor.



- Unplug connector -arrows- from intake manifold.
- Detach activated charcoal filter solenoid valve 1 - N80- and coolant hose from intake manifold.

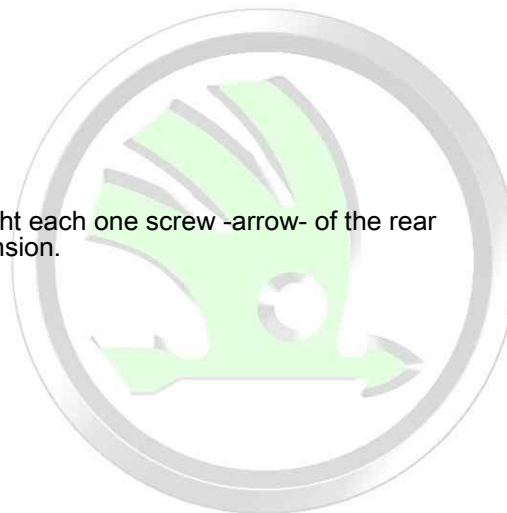


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- Disconnect plug -1- and remove throttle valve control unit - J338- -arrows-.

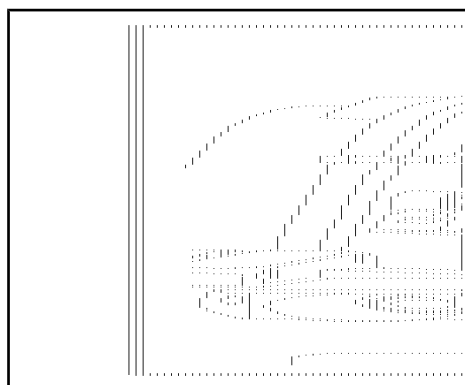
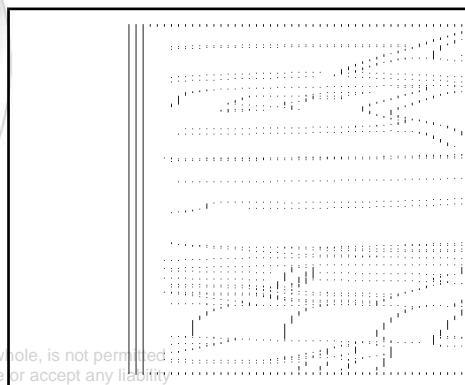
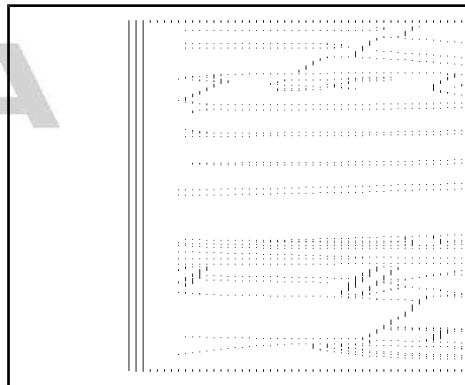
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- Release on left and right each one screw -arrow- of the rear intake manifold suspension.

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- Unscrew screws -arrows- for bottom part of intake manifold.



- Slacken the petrol fuel distributor and evenly detach it together with the injection valves -arrows- from the bottom part of the intake manifold.
- Carefully remove the intake manifold from the cylinder head and place the petrol fuel distributor together with the injection valves on a clean cloth in the engine compartment.



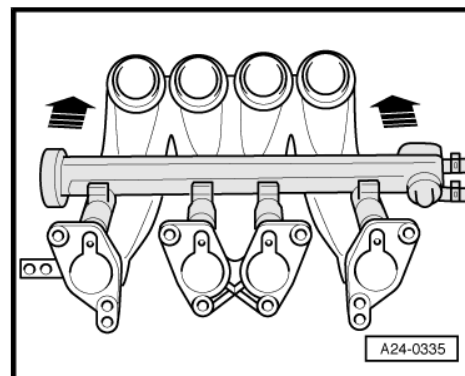
Note

Close air intake channels in the cylinder head with a clean cloth.

Install

Installation is carried out in the reverse order. Pay attention to the following:

- Replace gasket rings between intake manifold and cylinder head.
- Replace gasket rings between injection valves and intake manifold and moisten lightly with clean engine oil.
- Fit on the petrol fuel distributor with the injection valves and press down evenly on the intake manifold.
- Pay attention to the correct position of the gasket rings between the bottom part and the top part of the intake manifold.



Note

Secure all hose connections with corresponding hose clips.

Tightening torques

Component	Nm
Intake manifold to cylinder head	25
Intake manifold to support	8
Bracket for secondary air pump to intake manifold	8
Throttle valve support to intake manifold	8
Gas distributor to intake manifold	3

For vehicles with engine identification characters CHGA manufactured up to 12.2010 (emission level EU-4)

- Query and erase event memory of the LPG control unit
⇒ [“2.1 Connecting the diagnostic unit, querying and erasing the event memory of the liquefied petroleum gas system \(LPG\)”, page 3](#).

For vehicles with engine identification characters CHGA manufactured from 01.2011 (emission level EU-5)

- Querying and erasing event memory of engine control unit
⇒ Vehicle diagnostic tester.

For vehicles with engine identification characters CHGA

- After filling the gas line, carry out a leak tightness test on the natural gas system ⇒ Maintenance ; Booklet Octavia II .

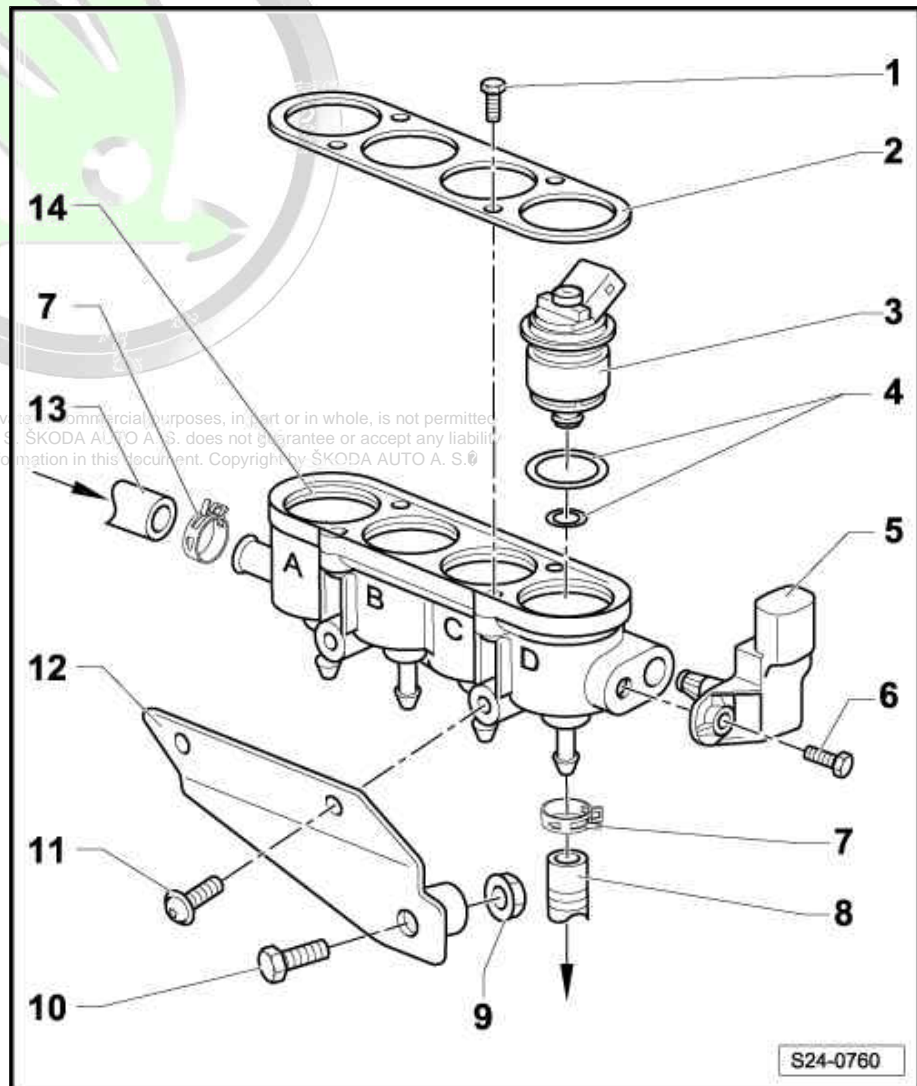


Caution

Check the compressed natural gas system for leaks, e.g. with a gas leakage detector for natural gas vehicles - VAS 6227-.

1.8 Gas distribution line (for LPG vehicles) - Summary of components

- 1 - 8 Nm
- 2 - Securing plate
- 3 - Gas inlet valve
 - ☐ removing and installing
⇒ "1.10 Removing and installing gas inlet valves (for LPG vehicles)", page 188
- 4 - O-ring
 - ☐ replace
- 5 - Gas distribution line sensor
- G401
- 6 - 8 Nm
- 7 - Spring strap clamp
- 8 - Gas line
 - ☐ To intake manifold
- 9 - Fixing nut
- 10 - 23 Nm
- 11 - 5 Nm
- 12 - Support
- 13 - Gas line
 - ☐ from gas filter
- 14 - Gas distribution line



1.9 Removing and installing gas distribution line (for LPG vehicles)



Note

- ◆ Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8.
- ◆ Observe safety measures and rules of cleanliness when working on the fuel supply (petrol)
⇒ "2.3 Safety precautions and rules for cleanliness when working on petrol fuel supply system", page 10.

Removing

- Empty gas line
⇒ "2.3 Emptying and filling up gas line", page 144.
- Disconnect the plug from the gas distribution line.

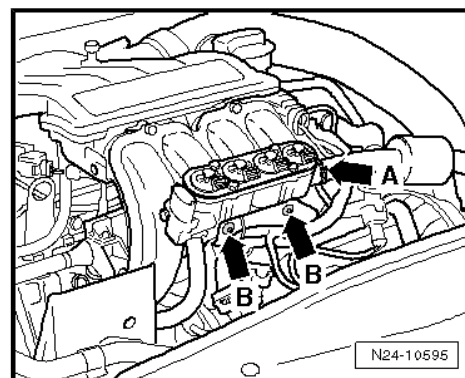


WARNING

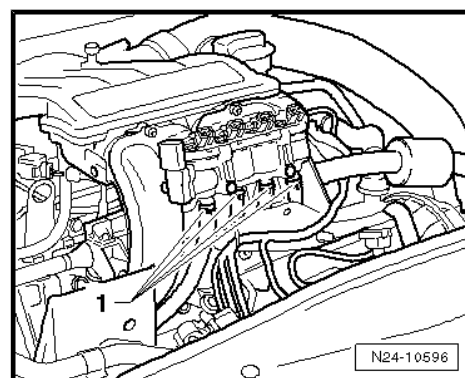
When loosening the gas line, gas may escape. Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding. Cover the connection point with a cloth and separate carefully.

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Loosen the clamp -arrow A- and detach the feed hose.



- Loosen the clamps -1- and detach the hoses from the gas distribution line.





- Unscrew the screws -arrows B- and remove the gas distribution line.

Install

Installation is carried out in the reverse order. Pay attention to the following:

- Tighten screws -arrows B- to tightening torque: 5 Nm



Caution

Check the compressed natural gas system for leaks, e.g. with a gas leakage detector for natural gas vehicles - VAS 6227- .

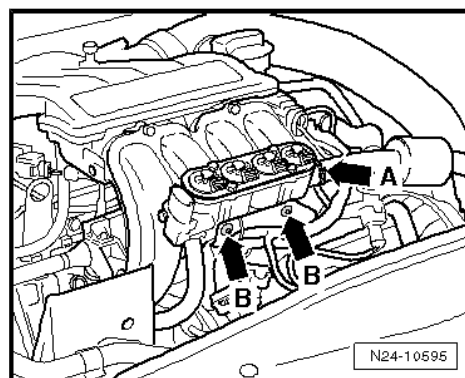
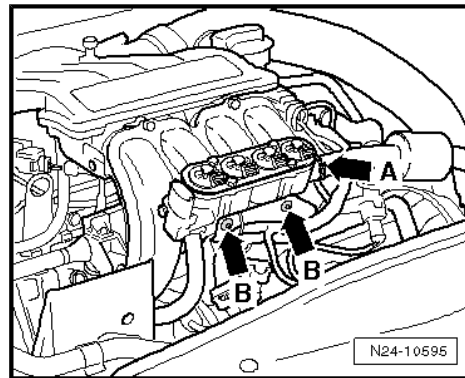
- After filling the gas line, carry out a leak tightness test on the natural gas system ⇒ Maintenance ; Booklet Octavia II .

For vehicles with engine identification characters CHGA manufactured up to 12.2010 (emission level EU-4)

- Query and erase event memory of the LPG control unit
⇒ [“2.1 Connecting the diagnostic unit, querying and erasing the event memory of the liquefied petroleum gas system \(LPG\)”, page 3](#) .

For vehicles with engine identification characters CHGA manufactured from 01.2011 (emission level EU-5)

- Querying and erasing event memory of engine control unit
⇒ Vehicle diagnostic tester.



1.10 Removing and installing gas inlet valves (for LPG vehicles)



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#) .

Removing

- Empty gas line
⇒ [“2.3 Emptying and filling up gas line”, page 144](#) .



WARNING

When loosening the gas line, gas may escape. Wear safety goggles and safety clothing, in order to avoid eye injuries and burns. Cover the connection points with a cloth and open carefully.

- Unplug connector of the gas inlet valves -N366- , -N367- , -N368- and -N369- .

- Unscrew securing bolts -arrows-.
- Remove locking plate and replace defective gas inlet valve.

Assignment of gas inlet valves:

- ◆ Gas inlet valve 1 - N366- : Cylinder 1
- ◆ Gas inlet valve 2 - N367- : Cylinder 2
- ◆ Gas inlet valve 3 - N368- : Cylinder 3
- ◆ Gas inlet valve 4 - N369- : Cylinder 4

Install

Installation is performed in the reverse order, pay attention to the following points:

- Fill up gas line
⇒ [“2.3 Emptying and filling up gas line”, page 144](#) .
- After filling the gas line, carry out a leak tightness test on the natural gas system ⇒ Maintenance ; Booklet Octavia II .



Caution

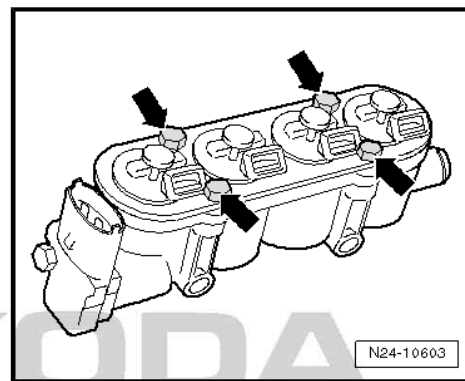
Check the compressed natural gas system for leaks, e.g. with a gas leakage detector for natural gas vehicles - VAS 6227- .

For vehicles with engine identification characters CHGA manufactured up to 12.2010 (emission level EU-4)

- Query and erase event memory of the LPG control unit
⇒ [“2.1 Connecting the diagnostic unit, querying and erasing the event memory of the liquefied petroleum gas system \(LPG\)”, page 3](#) .

For vehicles with engine identification characters CHGA manufactured from 01.2011 (emission level EU-5)

- Querying and erasing event memory of engine control unit
⇒ Vehicle diagnostic tester.





2 Testing components



Note

- ♦ *Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)*
⇒ *"2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8*.
- ♦ *Observe safety measures and rules of cleanliness when working on the fuel supply (petrol)*
⇒ *"2.3 Safety precautions and rules for cleanliness when working on petrol fuel supply system", page 10*.

2.1 Checking the tightness and injection rate of the injection valves

Special tools and workshop equipment required

- ♦ Remote control , e.g. -V.A.G 1348/3 A-
- ♦ Adapter cable , e.g. -V.A.G 1348/3-2-
- ♦ Hand multimeter , e.g. -V.A.G 1602-
- ♦ Measuring tool set , e.g. -V.A.G 1594 A, B nebo C-

2.1.1 Testing leak-tightness



WARNING

The fuel system is under pressure! Before opening the system lay cleaning cloths around the connection point. Reduce pressure by carefully releasing the connection point.

Test condition

- The fuel pressure must be OK- check:
⇒ *"2.2 Test fuel pressure regulator and holding pressure", page 193*.
- Remove intake manifold bottom part
⇒ *"1.5 Removing and installing bottom part of intake manifold", page 177*.
- Disconnect plugs of injection valves.
- Remove fuel rail together with injection valves from intake manifold and place on a clean cloth.

The fuel line remains attached to the fuel rail.

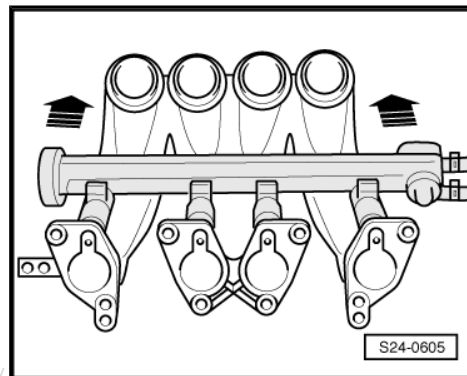
- Removing rear seat bench ⇒ Body Work; Rep. gr. 72 .
- Remove the cover from the fuel delivery unit.



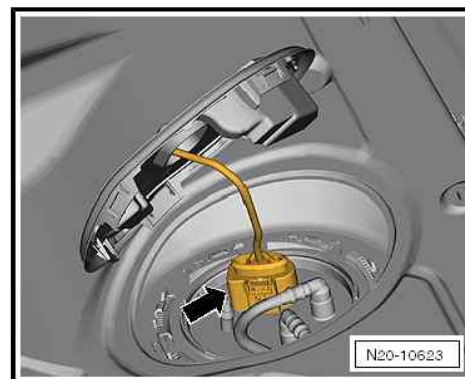
Note

For vehicles with auxiliary heating, the plug connection for the dosing pump - V54- must be disconnected additionally.

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- First of all check the plug -arrow- for correct fit. To do so, pull on the plug without pressing the catch. If the plug was not correctly plugged in, it may have caused a fault.
- Disconnect the plug -arrow- from the fuel delivery unit.
- Check contacts on plug and on fuel pump for damage.



- Connect test instrument adapter/DSO (5-pin) - VAS 5565- to connector and fuel delivery unit.
- Connect the remote control - V.A.G 1348/3A- to the adapter - VAS 5565- and to the battery positive (+).



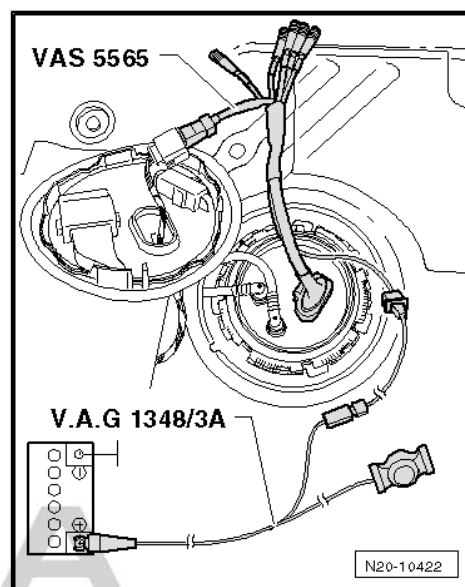
Note

This step is only intended to ensure that the fuel pump runs when the engine is switched off.

- Test the tightness of the injection valves (visual inspection). With the fuel pump running, only 1 to 2 drops a minute should drip out at each valve.

If the fuel loss is greater than this:

- Disconnect connection of fuse base F33 and Batterie (+) and replace leaking injection valve.



Note

- ♦ *If injectors are replaced, erase the learned values and re-adapt engine control unit ⇒ Vehicle diagnostic tester.*
- ♦ *Always fit new seals.*

2.1.2 Testing injection rate

Test conditions:

- The fuel pressure must be OK- check:
⇒ ["2.2 Test fuel pressure regulator and holding pressure", page 193](#).
- Bottom part of intake manifold removed.
- Injection valves installed in the fuel rail and fuel line connected.
- Fuel temperature 15...20°C, fuel must be according to the valid standards.



Note

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When testing the injection rate also check the jet formation. The jet must be the same for all valves.

- Place the injector to be tested in a graduated measuring glass of the injection rate tester.
- Removing rear seat bench ⇒ Body Work; Rep. gr. 72 .



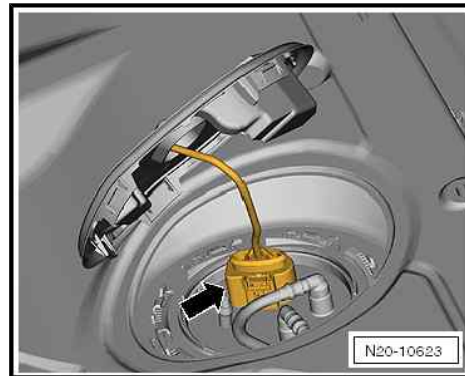
- Remove the cover from the fuel delivery unit.



Note

For vehicles with auxiliary heating, the plug connection for the dosing pump - V54- must be disconnected additionally.

- First of all check the plug -arrow- for correct fit. To do so, pull on the plug without pressing the catch. If the plug was not correctly plugged in, it may have caused a fault.
- Disconnect the plug -arrow- from the fuel delivery unit.
- Check contacts on plug and on fuel pump for damage.

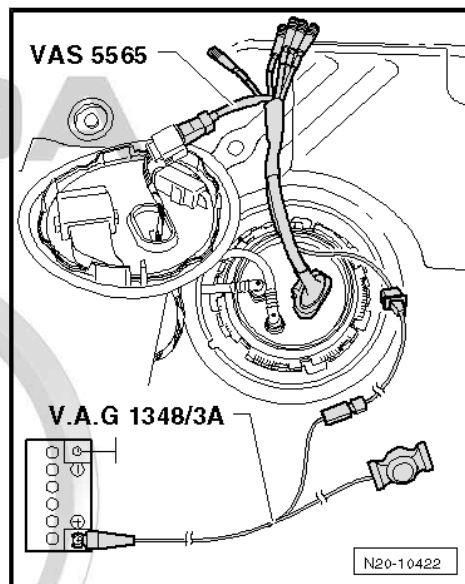


- Connect test instrument adapter/DSO (5-pin) - VAS 5565- to connector and fuel delivery unit.
- Connect the remote control - V.A.G 1348/3A- to the adapter - VAS 5565- and to the battery positive (+).

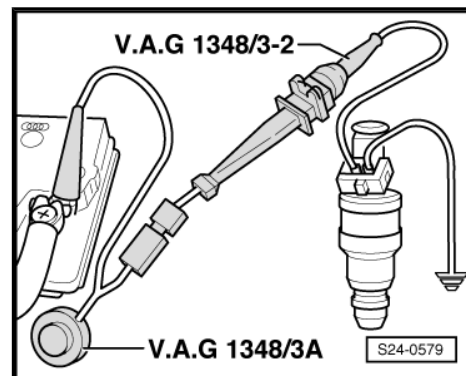


Note

This step is only intended to ensure that the fuel pump runs when the engine is switched off.



- Lay a contact from the injection valve to be tested on the engine mass using adapter cables from the measuring tool set.
- Connect the second contact of the injection valve using adapter cables to the remote control -V.A.G 1348/3 A- with the adapter cable -V.A.G 1348/3-2- .
- Connect alligator clip to the battery (+).
- Activate remote control -V.A.G 1348/3 A- for 30 seconds.
- Repeat test at the other injectors. While doing so use a new measuring glasses.
- After all the injectors have been operated, place the measuring glasses on a flat surface and compare the individual quantities of fuel injected.
- Specified value for vehicles with engine identification characters BGU, BSE, BSF: 84...99 ml per valve.
- Specified value for vehicles with engine identification characters CCSA, CMXA, CHGA: 115...134 ml per valve.



If the measurement obtained for one or several injection valves is below or above the specification:

- Replace the faulty injector.

The injectors are installed in the reverse order for removal. Pay attention to the following:

- ◆ Replace the O-rings on all the injectors and moisten lightly with clean engine oil.
- ◆ Fit the fuel rail with the installed injection valves to the intake manifold and tighten screws uniformly to 10 Nm.



Note

If injectors are replaced, erase the learned values and re-adapt engine control unit ⇒ Vehicle diagnostic tester.

2.2 Test fuel pressure regulator and holding pressure

Special tools and workshop equipment required

- ◆ Pressure gauge , e.g. -V.A.G 1318-
- ◆ Adapter , e.g. -V.A.G 1318/9-
- ◆ Adapter set , e.g. -V.A.G 1318/17-
- ◆ Double connection piece - V.A.G 1318/23-
- ◆ Remote control - V.A.G 1348/3 A-



Note

- ◆ *The fuel pressure regulator regulates the fuel pressure to approx 0.4 MPa (4 bar).*
- ◆ *The fuel pressure regulator is located on the fuel tank.*
- ◆ *Observe safety measures and rules of cleanliness when working on the fuel supply*
⇒ "2.3 Safety precautions and rules for cleanliness when working on petrol fuel supply system", page 10 .

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WARNING

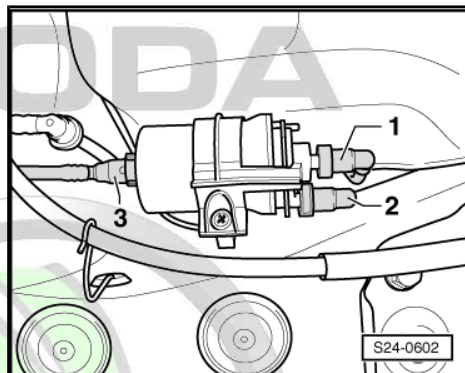
The fuel system is under pressure! Before opening the system lay cleaning cloths around the connection point. Reduce pressure by carefully releasing the connection point.

- Separate the connector of the fuel feed line -3- and collect the fuel with flows out with a cloth.

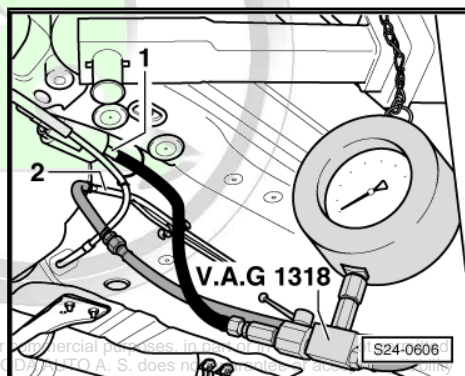


Note

Press in the securing ring in order to unlock the fuel line.



- Connect pressure gauge with adapter -V.A.G 1318/9- and with adapter set -V.A.G 1318/17- to fuel filter -1- and to fuel feed line -2-.
- Open shut-off cock of the pressure gauge. Lever points in direction of flow.
- Venting air from the fuel system
⇒ [“1.9 Venting air from the fuel system”, page 139](#) .
- Start engine and run in idle.
- Measure fuel pressure.



Specified value: approx. 0.4 MPa (4 bar) overpressure.

If the specified value is not reached:

- Switch off ignition.
- Check the fuel flow rate of the fuel pump
⇒ [“1.8.2 Check fuel flow rate”, page 133](#) .
- If the fuel delivery unit is o.k., replace the fuel pressure regulator.

If the specified value is reached:

- Switch off ignition.
- Check for tightness and holding pressure (complete system). To this end observe the pressure drop on the pressure gauge. After 10 minutes there must still be at least 0.3 MPa (3 bar) present.

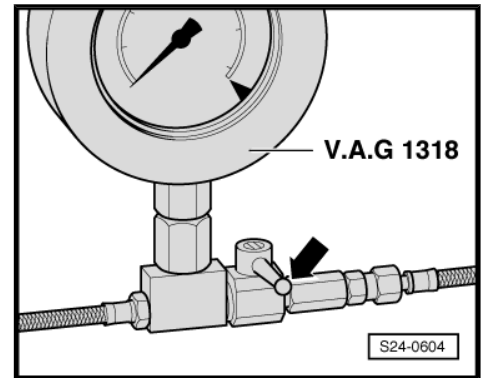
If the holding pressure drops below 0.3 MPa (3 bar):

- Start engine and run in idle.

- After the pressure has built up, switch ignition off. At the same time close the shut-off cock of the pressure gauge (lever at right angles to direction of flow) -arrow-.
- Observe pressure drop (engine side) on pressure gauge.

If the pressure again drops:

- Check the line connections, the O-rings on the fuel rail and the injection valves for tightness
⇒ [“2.1 Checking the tightness and injection rate of the injection valves”, page 190](#) .
- Inspect pressure measuring device for leaks.



Note

Before removing the pressure gauge, place the cloth again around the line connection.

If the pressure does not drop:

- Check the line connections to the fuel tank and the non-return valve of the fuel delivery unit
⇒ [“1.8.4 Checking the non-return valve on the fuel pump”, page 137](#) .
- If the non-return valve is o.k., replace the fuel pressure regulator.
- Venting air from the fuel system
⇒ [“1.9 Venting air from the fuel system”, page 139](#) .

2.3 Test intake manifold changeover

The test should only be carried out if there is a problem with a poor torque, i.e. if insufficient elasticity or poor pulling power exists.

Special tools and workshop equipment required

- ◆ Hand vacuum pump with accessories , e.g. -V.A.G 1390-
- ◆ Vacuum tester , e. g. -V.A.G 1368-
- The valve for variable intake manifold changeover -N156- was checked with the vehicle diagnosis, measurement and information system -VAS 5051- under “targeted fault finding”

If the valve for variable intake manifold changeover -N156- is o.k., perform the following tests:

- Inspect vacuum lines to see that they are connected properly.
- Check vacuum hoses for porosity.
- Inspect the vacuum system for tightness.



Check the vacuum setting element in the top part of intake manifold for tightness

- Detach the vacuum hose to the variable intake manifold changeover positioning element -arrow- at the variable intake manifold changeover valve -1-.



Note

The positioning element of the variable intake manifold changeover is integrated in the intake manifold and is therefore not visible from the outside.

- Connect the hand vacuum pump to the vacuum tester -V.A.G 1368- -connection B-.
- Connect vacuum hose for positioning element to vacuum tester -V.A.G 1368- -connection A-.
- Move vacuum tester -V.A.G 1368- into position -A/B-.
- Operate the hand vacuum pump several times. Build up a vacuum to a maximum of 0.05 MPa (0.5 bars).
- The vacuum must not drop.

If the vacuum drops:

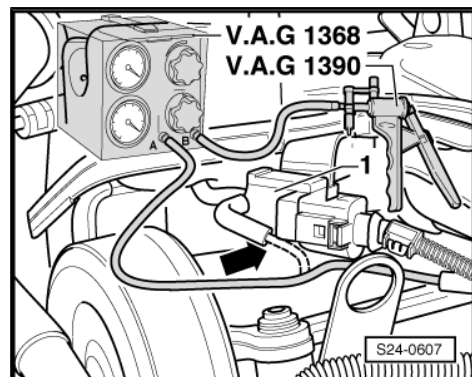
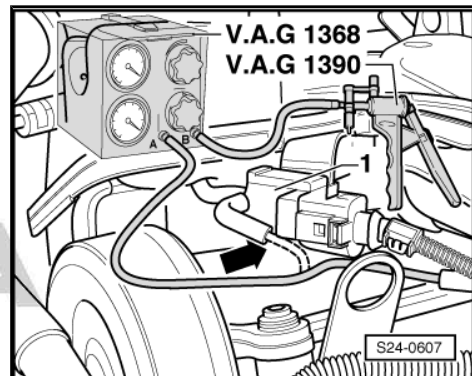
- Replace top part of intake manifold.

If the vacuum does not drop:

- Check the change-over mechanics on the intake manifold flap for ease of movement.
- Remove bottom part of intake manifold.
- Check vacuum setting element for tightness. Check whether the intake manifold flap moves.

If a fault is found:

- Replace top part of intake manifold.



3 Engine control units

3.1 Removing and installing engine control unit - J361-



Note

- ◆ *In order to be able to unplug the connector from the control unit, the control unit must always be removed.*
- ◆ *The learning values are erased when the plug is removed from the engine control unit, the event memory contents are retained.*
- ◆ *If the engine control unit should be replaced, connect vehicle diagnosis, measurement and information system - VAS 5051- and in the guided fault detection system carry out "replace engine control unit".*
- ◆ *If the engine control unit is replaced, the throttle valve control unit - J338- must be cleaned before the adaptation
⇒ "1.6 Clean throttle valve control unit J338 ", page 181 .*
- ◆ *Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8 .*

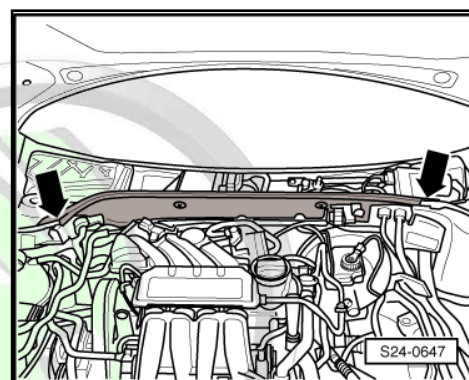
Special tools and workshop equipment required

- ◆ Body saw e.g. -V.A.G 1523 A-

Removing

- Switch off ignition.
- Remove the cooling water tank cover ⇒ Body Work; Rep. gr. 66 .
- Remove bulkhead plenum chamber -arrows-.
- Removing windscreen wiper and washer system ⇒ Electrical System; Rep. gr. 92 .

For vehicles with protective housing





- Cut with body saw -1- a slot for the cross-head screwdriver in the heads of the pull-off screws -2-.



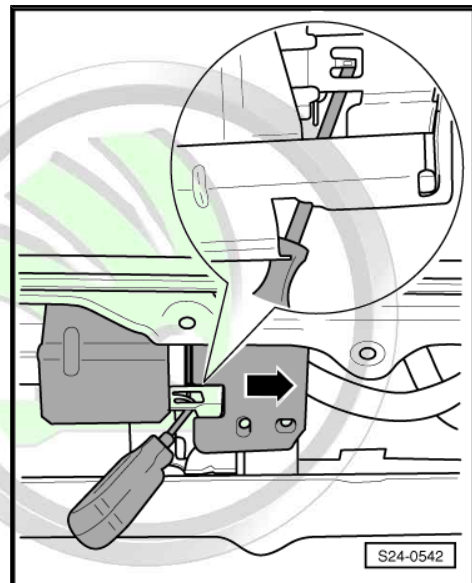
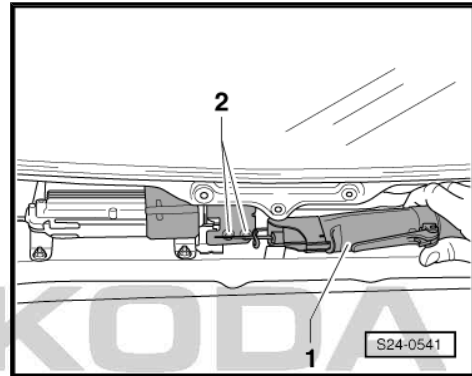
Note

- ◆ *It must be sawed twice with the body saw, so that the slot is wide enough, in order to unscrew the screws with a suitable screwdriver.*
- ◆ *The pull-off screws until are inserted with locking agent.*

- Unscrew screws -2-.
- Lift locking tab of protective cover with a cross-head screwdriver.
- Push the protective cover in the -direction of the arrow- out of the bracket for engine control unit.

Continued for all vehicles

- Disconnect front plug -1- and remove from engine control unit.



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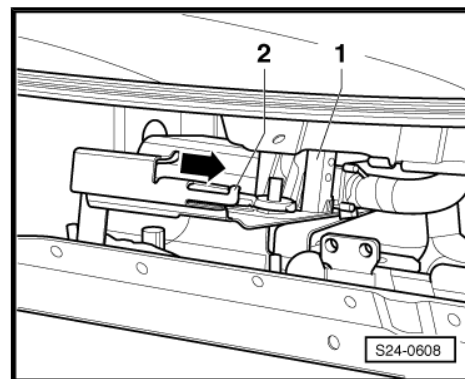
- Lever off retaining bracket -2- slightly.
- Push engine control unit out of the bracket -arrow-.
- Disconnect rear plug and remove from engine control unit.

Install



Note

For vehicles with protective cover, the metal swarfs must be suctioned out of the plenum chamber before installing the engine control unit.



- Connect rear plug to engine control unit and lock.
- Push engine control unit into the bracket and lock the retaining bracket -2-.
- Connect front plug to engine control unit and lock.

For vehicles with protective housing

- Fasten protective cover with new pull-off screws (before tightening align the protective cover in such a way that it does not come into contact with the surrounding components)

Continued for all vehicles

- Installing windscreen wiper and washer system ➔ Electrical System; Rep. gr. 92 .
- Install bulkhead plenum chamber and plenum chamber cover ➔ Body Work; Rep. gr. 66 .

3.2 Removing and installing liquefied petroleum gas control unit (for LPG vehicles)



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

➔ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8 .

3.2.1 For vehicles manufactured up to 12.2010 (exhaust emission standard EU-4)



Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

➔ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8 .

Removing

- Switch off ignition and withdraw ignition key.
- Remove battery ➔ Electrical System; Rep. gr. 27 .
- Remove liquefied petroleum gas control unit from battery tray.

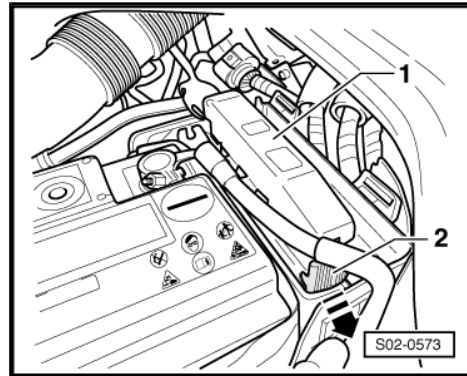


- Push out the securing element -2- of the connector for the liquefied petroleum gas control unit up to the stop.
- Disconnect the plug from the liquefied petroleum gas control unit -1-.

Install

Installation is performed in the reverse order, pay attention to the following points:

- Query and erase event memory of the LPG control unit
⇒ ["2.1 Connecting the diagnostic unit, querying and erasing the event memory of the liquefied petroleum gas system \(LPG\)", page 3](#).
- After installing the liquefied petroleum gas control unit, carry out a leak tightness test on the natural gas system ⇒ Maintenance ; Booklet Octavia II .



3.2.2 For vehicles manufactured as of 01.2011 (exhaust emission standard EU-5)



Note

- ♦ For vehicles manufactured as of 01.2011 (exhaust emission standard EU-5), the liquefied petroleum gas control unit (LPG) is not self-diagnostic. The petrol engine control unit -J361- controls and manages all the functions of the LPG system (including the event memory). The liquefied petroleum gas control unit (LPG) must only be activated in the "Gateway" for the data update, afterwards the control unit must be deactivated again.

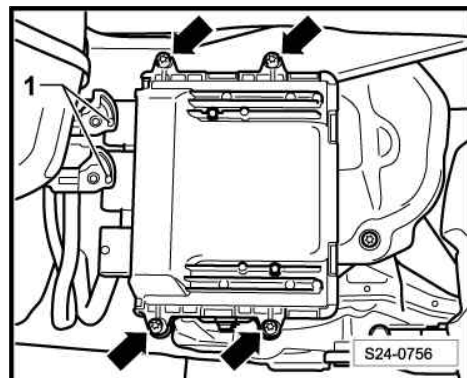
- ♦ Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ ["2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)", page 8](#).

- Switch off ignition and withdraw ignition key.
- Remove the sound dampening system ⇒ Body Work; Rep. gr. 50 .
- Remove the left wheelhouse liner bottom part ⇒ Body Work; Rep. gr. 66 .
- Screw out screws -arrows- and remove liquefied petroleum gas control unit from bracket.
- Disconnect the plug -1- from the liquefied petroleum gas control unit.

Install

Installation is performed in the reverse order, pay attention to the following points:

- Querying and erasing event memory of engine control unit
⇒ Vehicle diagnostic tester.
- After installing the liquefied petroleum gas control unit, carry out a leak tightness test on the natural gas system ⇒ Maintenance ; Booklet Octavia II .



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26 – Exhaust system

1 Removing and installing parts of the exhaust system



Note

- ◆ Replace the gaskets and the self-locking nuts.
- ◆ After performing installation work on the exhaust system, make sure the exhaust system is not mounted under tension and has adequate clearance from the vehicle body. If necessary slacken the clamping sleeves and align the silencer and exhaust pipe so as to create adequate clearance between these components and the vehicle body, and that the weight of the exhaust system is evenly distributed over the hangers.

1.1 Exhaust system for engines with identification characters BGU, BSE, BSF, CCSA, CHGA - Summary of components

1 - Rear tunnel bridge

2 - The middle silencer

- ☐ for first equipment building unit with rear silencer. Replace individually when carrying out repairs
- ☐ Separation point
⇒ ["1.4 Replacing middle or rear part of the exhaust system", page 206](#)
- ☐ Align exhaust system free of stress
⇒ ["1.6 Aligning exhaust system free of stress", page 209](#)

3 - 23 Nm

4 - Retaining strap

- ☐ replace if damaged

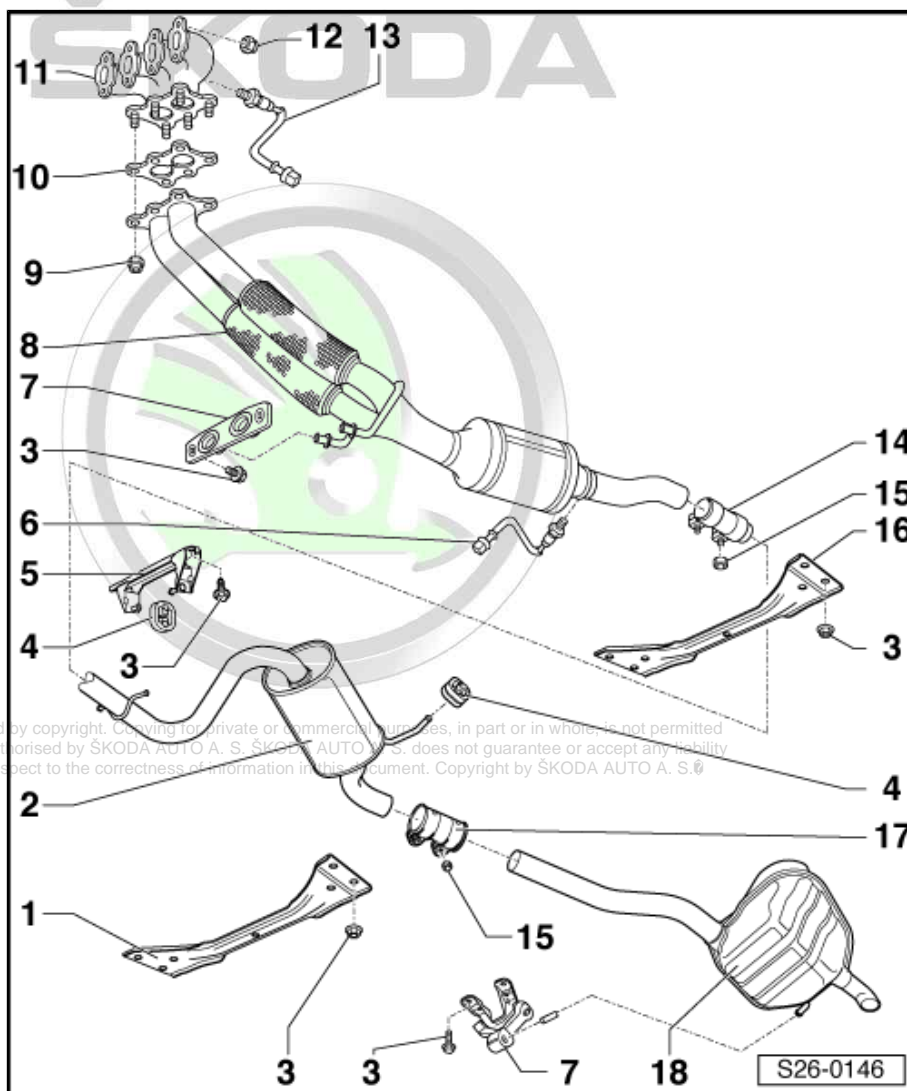
5 - Hanger

6 - Lambda probe downstream of catalytic converter -G130-, 50 Nm

- ☐ only coat thread with hot screw paste "G 052 112 A3"; hot screw paste must not get into the slot of the probe body.
- ☐ use lambda probe wrench for removing and installing

7 - Hanger

- ☐ replace if damaged





8 - Pre-exhaust pipe

- ☐ with catalytic converter
- ☐ protect against shocks and blows
- ☐ with decoupling element
- ☐ do not twist decoupling element more than 10° - risk of damage
- ☐ removing and installing
⇒ ["1.3 Removing and installing pre-exhaust pipe with catalytic converter", page 204](#)
- ☐ Align exhaust system free of stress ⇒ ["1.6 Aligning exhaust system free of stress", page 209](#)

9 - 25 Nm

- ☐ replace
- ☐ Coat stud bolts of exhaust manifold with hot bolt paste G 052 112 A3
- ☐ observe the order of tightening up
⇒ ["1.3 Removing and installing pre-exhaust pipe with catalytic converter", page 204](#)

10 - Gasket

- ☐ replace

11 - Exhaust manifold

- ☐ removing and installing ⇒ ["1.5 Removing and installing exhaust manifold", page 207](#)

12 - 25 Nm

- ☐ replace
- ☐ Coat stud bolts of exhaust manifold with hot bolt paste G 052 112 A3

13 - Lambda probe upstream of catalytic converter -G39- , 50 Nm

- ☐ only coat thread with hot screw paste "G 052 112 A3"; hot screw paste must not get into the slot of the probe body.
- ☐ use lambda probe wrench for removing and installing

14 - Front clamping sleeve

- ☐ align exhaust system free of stress before tightening
⇒ ["1.6 Aligning exhaust system free of stress", page 209](#)
- ☐ Fitting position: The end of the screw must not extend beyond the lower edge of the clamping sleeve, the screw fitting must face the right.
- ☐ Tighten bolted connections evenly

15 - 23 Nm

16 - Front tunnel bridge

17 - Rear clamping sleeve

- ☐ for replacing the middle or rear silencer
- ☐ Fitting position: The end of the screw must not extend beyond the lower edge of the clamping sleeve, the screw fitting must face the right.
- ☐ Tighten bolted connections evenly

18 - Rear silencer

- ☐ For first equipment building unit with middle silencer. Replace individually when carrying out repairs
- ☐ Separation point ⇒ ["1.4 Replacing middle or rear part of the exhaust system", page 206](#)
- ☐ Align exhaust system free of stress ⇒ ["1.6 Aligning exhaust system free of stress", page 209](#)

1.2 Exhaust system for engines with identification characters CMXA - Summary of components

1 - Rear tunnel bridge

2 - The middle silencer

- ☐ for first equipment building unit with rear silencer. Replace individually when carrying out repairs
- ☐ Separation point
⇒ ["1.4 Replacing middle or rear part of the exhaust system"](#), page 206
- ☐ Align exhaust system free of stress
⇒ ["1.6 Aligning exhaust system free of stress"](#), page 209

3 - 23 Nm

4 - Retaining strap

- ☐ replace if damaged

5 - Hanger

6 - Lambda probe downstream of catalytic converter -G130-, 50 Nm

- ☐ only coat thread with hot screw paste "G 052 112 A3"; hot screw paste must not get into the slot of the probe body.
- ☐ use lambda probe wrench for removing and installing

7 - Hanger

- ☐ replace if damaged

8 - Pre-exhaust pipe

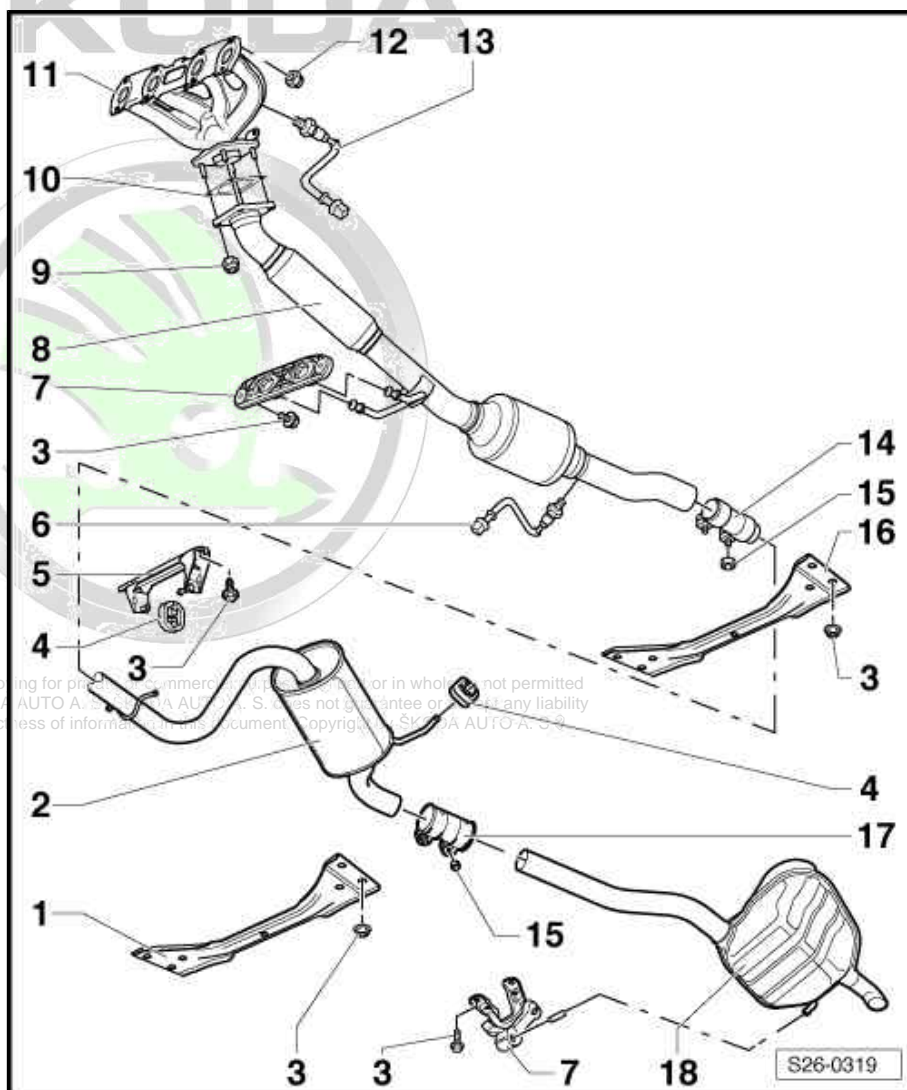
- ☐ with catalytic converter
- ☐ with decoupling element
- ☐ do not twist decoupling element more than 10° - risk of damage
- ☐ Secure the decoupling element with the transport lock - T10403- to prevent overtensioning.
- ☐ removing and installing
⇒ ["1.3 Removing and installing pre-exhaust pipe with catalytic converter"](#), page 204
- ☐ Align exhaust system free of stress ⇒ [page 209](#)

9 - 25 Nm

- ☐ replace
- ☐ Coat stud bolts of exhaust manifold with hot bolt paste G 052 112 A3
- ☐ observe the order of tightening up
⇒ ["1.3 Removing and installing pre-exhaust pipe with catalytic converter"](#), page 204

10 - Gasket

- ☐ replace





11 - Exhaust manifold

- ☐ removing and installing ⇒ [“1.5 Removing and installing exhaust manifold”, page 207](#)

12 - 25 Nm

- ☐ replace
- ☐ Coat stud bolts of exhaust manifold with hot bolt paste G 052 112 A3

13 - Lambda probe upstream of catalytic converter -G39- , 50 Nm

- ☐ only coat thread with hot screw paste “G 052 112 A3”; hot screw paste must not get into the slot of the probe body.
- ☐ use lambda probe wrench for removing and installing

14 - Front clamping sleeve

- ☐ align exhaust system free of stress before tightening
⇒ [“1.6 Aligning exhaust system free of stress”, page 209](#)
- ☐ Fitting position: The end of the screw must not extend beyond the lower edge of the clamping sleeve, the screw fitting must face the right.
- ☐ Tighten bolted connections evenly

15 - 23 Nm

16 - Front tunnel bridge

17 - Rear clamping sleeve

- ☐ for replacing the middle or rear silencer
- ☐ Fitting position: The end of the screw must not extend beyond the lower edge of the clamping sleeve, the screw fitting must face the right.
- ☐ Tighten bolted connections evenly

18 - Rear silencer

- ☐ For first equipment building unit with middle silencer. Replace individually when carrying out repairs
- ☐ Separation point ⇒ [“1.4 Replacing middle or rear part of the exhaust system”, page 206](#)
- ☐ Align exhaust system free of stress ⇒ [“1.6 Aligning exhaust system free of stress”, page 209](#)

1.3 Removing and installing pre-exhaust pipe with catalytic converter

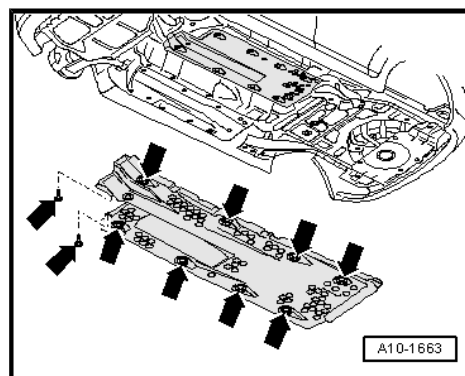


Note

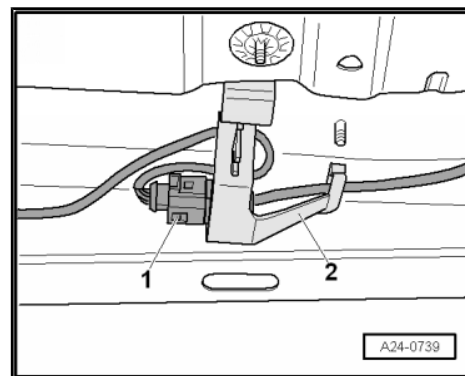
Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG) ⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#).

Removing

- Remove underbody cover on right -arrows-.



- Disconnect plug connection -1- for lambda probe downstream of catalytic converter - G130- .
- Take quick coupling out of the bracket -2- and expose cable to lambda probe.



- Remove front tunnel bridge for underbody -arrows-.

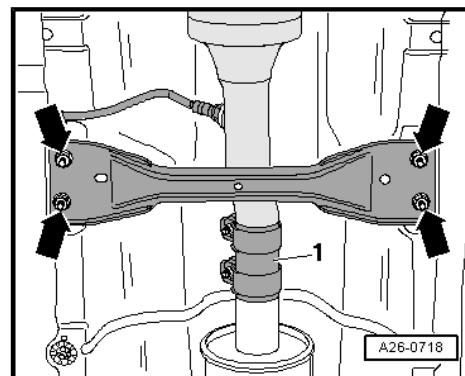


Note

The decoupling elements in the pre-exhaust pipe should not be bent by more than 10° - risk of damage.

- Remove clamping sleeve -1- and separate exhaust pipe.

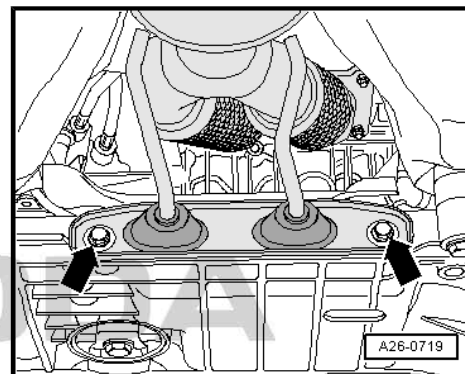
For engine with identification characters BGU, BSE, BSF, CCSA, CHGA



- Unbolt bracket for exhaust pipe -arrows-.

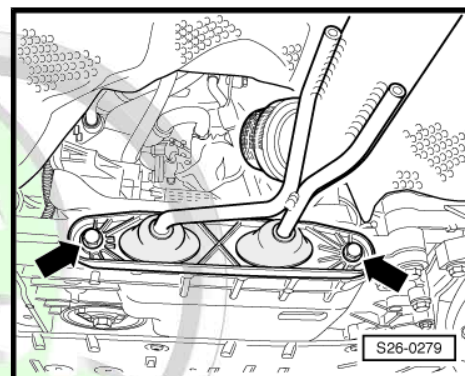
For engine with identification characters CMXA

- Secure the decoupling element with the transport security - T10403- against overtensioning.



- Unbolt bracket for exhaust pipe -arrows-.

For all vehicles





- If present, unscrew heat shield for right drive shaft -1-.
- Unscrew the fixing nuts from the pre-exhaust pipe Pos. -9-:
- ♦ ⇒ ["1.1 Exhaust system for engines with identification characters BGU, BSE, BSF, CCSA, CHGA - Summary of components", page 201](#) .
- ♦ ⇒ ["1.2 Exhaust system for engines with identification characters CMXA - Summary of components", page 203](#) .
- Remove exhaust pipe with catalytic converter

Install

Installation is performed in the reverse order, pay attention to the following points:



Note

Replace the gaskets and the self-locking nuts.

For engine with identification characters BGU, BSE, BSF, CCSA, CHGA

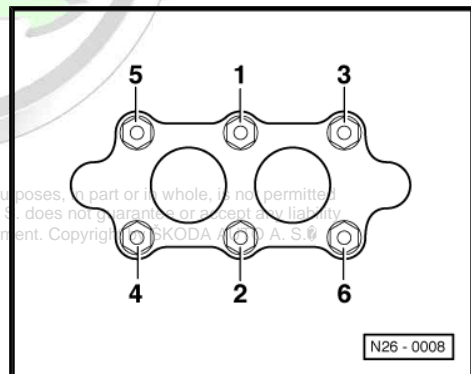
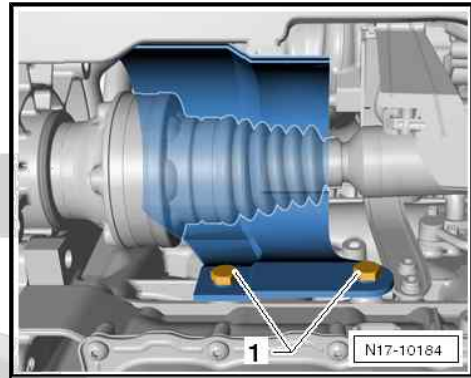
- Tighten exhaust pipe in the indicated tightening order at exhaust manifold.

For all vehicles

- Align exhaust system free of stress
⇒ ["1.6 Aligning exhaust system free of stress", page 209](#) .

Tightening torques

Component	Nm
Heat shield for drive shaft to cylinder block	35 Nm



1.4 Replacing middle or rear part of the exhaust system

Special tools and workshop equipment required

- ♦ Body saw e.g. -V.A.G 1523 A -
- ♦ Protective goggles



Note

- ♦ *To replace the front or rear silencer individually, a separation point is provided in the connecting pipe.*
- ♦ *The separation point is marked by indentations on the circumference of the exhaust pipe.*
- ♦ *Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)*
⇒ ["2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)", page 8](#) .

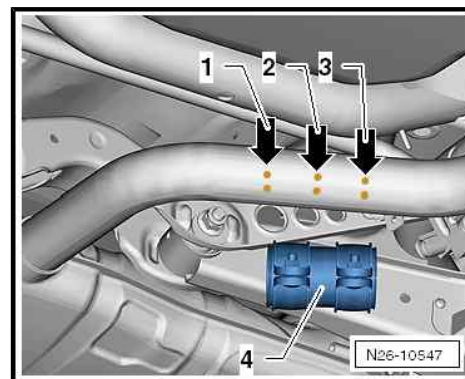
Work procedure



WARNING

In order to avoid injuries because of metal swarfs, wear safety goggles and safety clothing.

- Separate exhaust pipe at the separation point -arrow 2- with body saw (right-angled).
- When installing, position rear clamping sleeve -4- at the side markings -arrow 1- and -arrow 3-.
- Turn the rear clamping sleeve -4- in such a way that the ends of the screws are as far upwards as possible.
- Align rear silencer horizontally and tighten rear clamping sleeve -4- to 23 Nm.
- Align exhaust system in cold condition free of stress
⇒ [“1.6 Aligning exhaust system free of stress”, page 209](#) .



1.5 Removing and installing exhaust manifold



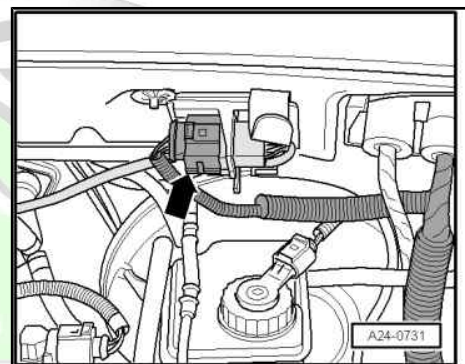
Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)
⇒ [“2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system \(LPG\)”, page 8](#) .

Removing

- Remove pre-exhaust pipe with catalytic converter
⇒ [“1.3 Removing and installing pre-exhaust pipe with catalytic converter”, page 204](#) .
- Completely remove the intake manifold
⇒ [“1.7 Completely removing and installing the intake manifold”, page 182](#) .
- Remove the plug connection -arrow- for the lambda probe upstream of catalytic converter -G39- from the bracket and disconnect.

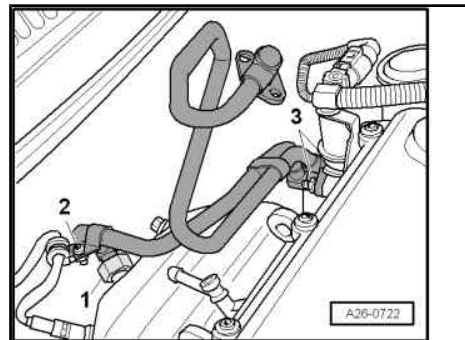
For engine with engine code BGU





- Unscrew cable clamp -2-.
- Loosen union nut -1-.
- Release nuts -3- and remove connection pipe for exhaust gas recirculation.

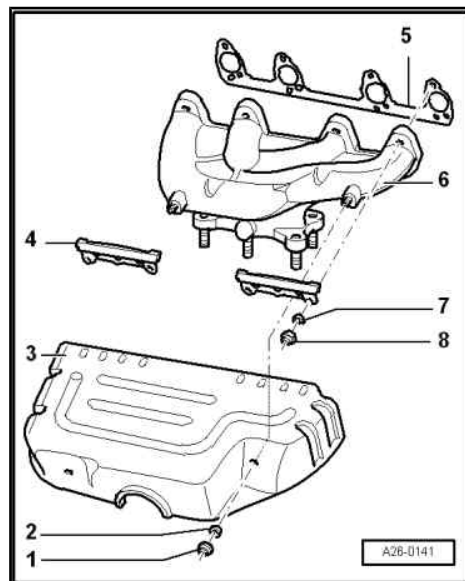
For engine with identification characters BGU, BSE, BSF, CCSA, CHGA



- Unscrew nuts -1- for heat shield -3-, take off washers -2-.
- Unscrew nuts -8- on both brackets -4-, take off washers -7-.
- Unscrew remaining nuts at exhaust manifold -6-, take off washers.

For engine with identification characters CMXA

- Remove heat shield.
- Unscrew the fixing nuts -Position 12-
⇒ [“1.2 Exhaust system for engines with identification characters CMXA - Summary of components”, page 203](#) on the exhaust manifold.



For all vehicles

- Take off exhaust manifold and gasket for exhaust manifold.

Install

Installation is performed in the reverse order, pay attention to the following points:



Note

Replace the gaskets and the self-locking nuts.

- Completely install the intake manifold
⇒ [“1.7 Completely removing and installing the intake manifold”, page 182](#).
- Install exhaust pipe with catalytic converter
⇒ [“1.3 Removing and installing pre-exhaust pipe with catalytic converter”, page 204](#).
- Align exhaust system free of stress
⇒ [“1.6 Aligning exhaust system free of stress”, page 209](#).

Tightening torques

Component	Nm
Heat shield to exhaust manifold	23 Nm
Connection pipe for exhaust gas recirculation to mechanical exhaust gas recirculation valve	23 Nm
Connecting pipe for exhaust gas recirculation to exhaust manifold	60 Nm

1.6 Aligning exhaust system free of stress

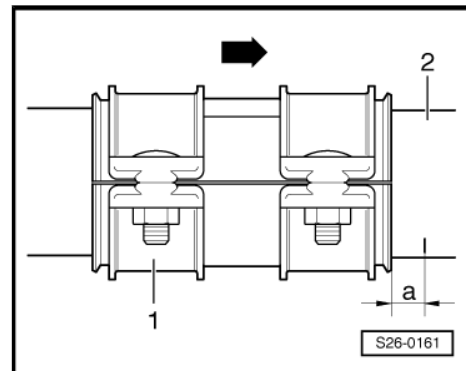


Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8.

- The exhaust system is aligned when cold.
- Slacken nuts of front clamping sleeve.



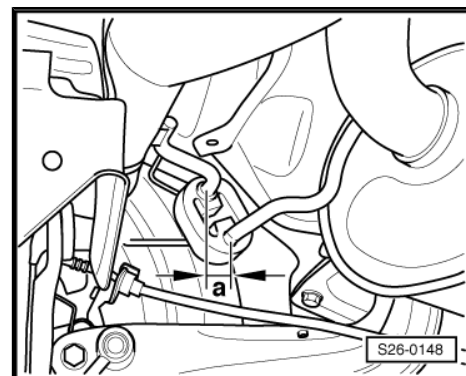
- Push the exhaust system forward until the pre-tensioning -dimension a- on the retaining strap of the middle silencer is 9-11 mm.

- Install the front clamping sleeve -Position 14-:

◆ ⇒ "1.1 Exhaust system for engines with identification characters BGU, BSE, BSF, CCSA, CHGA - Summary of components", page 201.

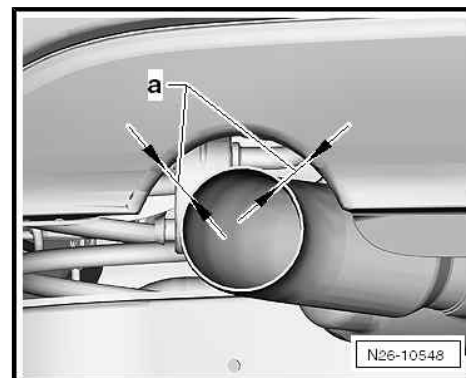
◆ ⇒ "1.2 Exhaust system for engines with identification characters CMXA - Summary of components", page 203.

- Tighten nuts of clamping sleeve evenly to 23 Nm.



Align exhaust tailpipe

- Align rear silencer in such a way that there is an equal distance -a- between bumper opening and exhaust tailpipe.
- To take the mean of the exhaust tailpipe, if necessary loosen the suspension of the rear silencer.



1.7 Inspecting the exhaust system for leak-tightness

- Start engine and run in idle.

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Seal off exhaust tailpipe for the duration of the leak check (e.g. with cloths or plugs).

- All connection points: Inspect cylinder head/exhaust manifold, exhaust manifold/pre-exhaust pipe etc. for leak tightness by listening.



- Eliminate any leak found.

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2 Exhaust gas recirculation system

⇒ **"2.1 Exhaust gas recirculation for engines with identification characters BGU - Summary of components", page 211**

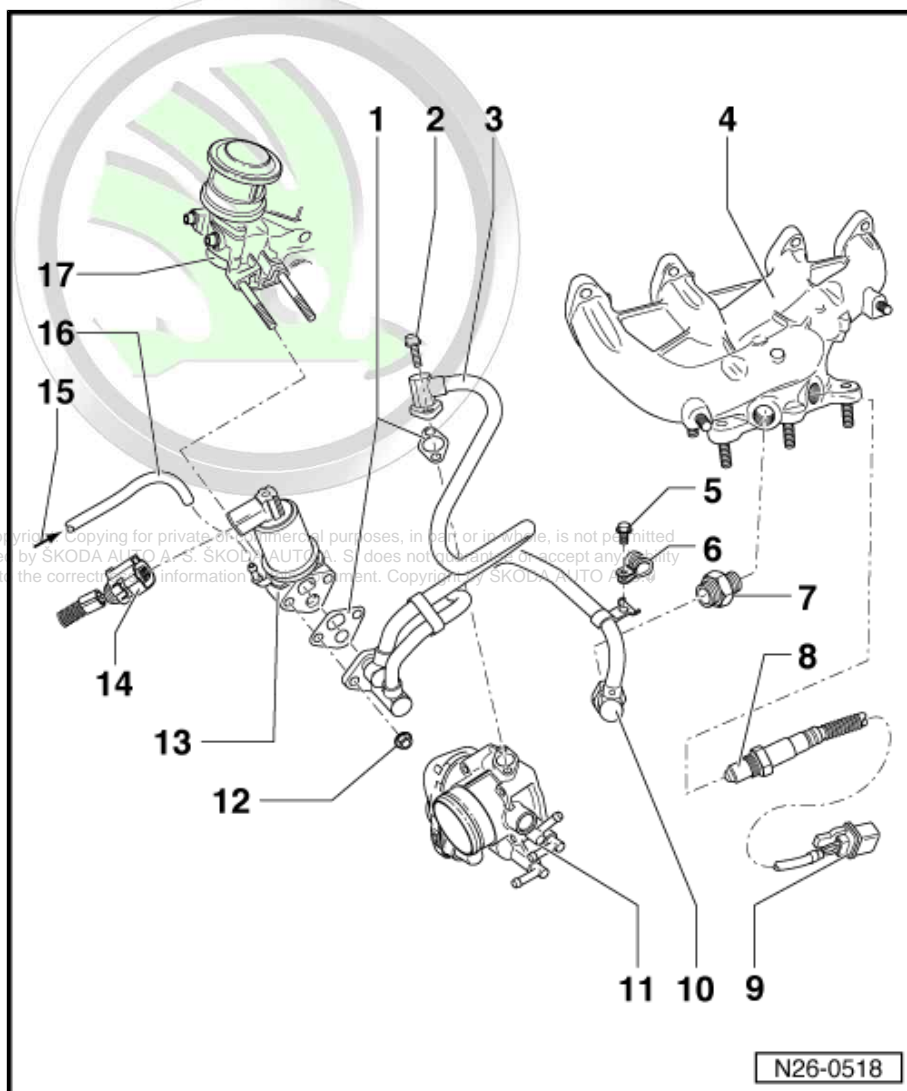


Note

- ◆ For certain operating conditions, the intake air is supplied with exhaust via the exhaust gas recirculation valve -N18-. A decrease in the combustion temperature and therefore an improvement of the exhaust composition is achieved by adding to this mixture.
- ◆ The actuation of the exhaust gas recirculation valve -N18- is performed by the engine control unit.
- ◆ Any desired valve position is possible as a result of the pulsed operation.
- ◆ An exhaust gas recirculation valve -N18- blocked in open condition is indicated through poor idling behaviour.

2.1 Exhaust gas recirculation for engines with identification characters BGU - Summary of components

- 1 - Gasket
 - ☐ replace
- 2 - 10 Nm
- 3 - Connecting pipe
 - ☐ for exhaust gas recirculation
- 4 - Exhaust manifold
- 5 - 4 Nm
- 6 - Bushing
 - ☐ for lambda probe cable upstream of catalytic converter
- 7 - 80 Nm
- 8 - Lambda probe upstream of catalytic converter -G39-, 50 Nm
- 9 - Connector
- 10 - 60 Nm
- 11 - Throttle valve control unit -J338-
- 12 - 25 Nm
- 13 - Exhaust gas recirculation valve -N18- with exhaust gas recirculation potentiometer -G212-
 - ☐ after replacing the engine control unit or the EGR valve -N18- the engine control unit and the exhaust gas recirculation



N26-0518



tion valve must be adapted to each other ⇒ Vehicle diagnostic tester

14 - Connector

15 - From air filter

16 - Breather hose

17 - Connection flange with combination valve

- ☐ Holder for the exhaust gas recirculation valve -N18-

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3 Secondary air system

⇒ **"3.1 Secondary air system for engines with identification characters BGU, BSE, CCSA, CHGA - Summary of components", page 213**

⇒ **"3.2 Check secondary air injection combination valve for proper operation and tightness - Engines with identification characters BGU, BSE, CCSA, CHGA, CMXA", page 214**

A fast heating up and therefore an earlier operational readiness of the catalytic converter after the cold start is achieved through the secondary air system.

3.1 Secondary air system for engines with identification characters BGU, BSE, CCSA, CHGA - Summary of components

1 - Combination valve

- ☐ check for proper operation and for tightness
⇒ **"3.2 Check secondary air injection combination valve for proper operation and tightness - Engines with identification characters BGU, BSE, CCSA, CHGA, CMXA", page 214**

2 - 25 Nm

- ☐ is mounted in the engines with identification characters BGU

3 - Exhaust gas recirculation valve -N18- with exhaust gas recirculation potentiometer - G212-

- ☐ is mounted in the engines with identification characters BGU

4 - 10 Nm

5 - O-ring

- ☐ replace if damaged

6 - Pressure hose

- ☐ check for firm seating
- ☐ press together at front to unlock

7 - Air intake hose

8 - to air filter

9 - Secondary air pump -V101-

10 - Connector

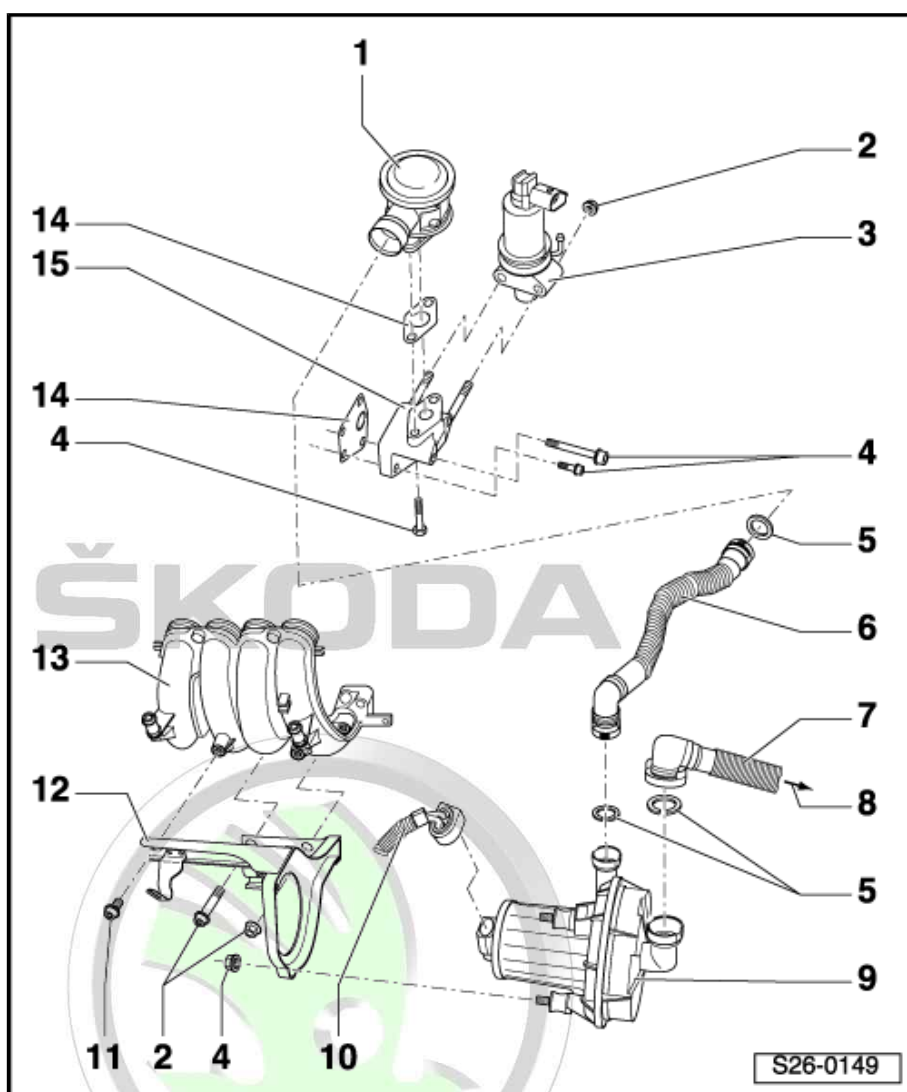
11 - 15 Nm

12 - Support

13 - Bottom part of intake manifold

14 - Gasket

- ☐ Check fitting position



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- ☐ replace

15 - Connecting piece

- ☐ for the combination valve
- ☐ Holder for the exhaust gas recirculation valve -N18-
- ☐ Engines with identification characters BSE have no connection for exhaust gas recirculation valve

3.2 Check secondary air injection combination valve for proper operation and tightness - Engines with identification characters BGU, BSE, CCSA, CHGA, CMXA



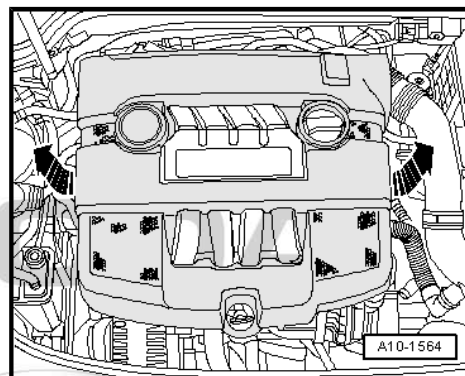
Note

Observe safety measures and rules for cleanliness when working on vehicles with liquefied petroleum gas system (LPG)

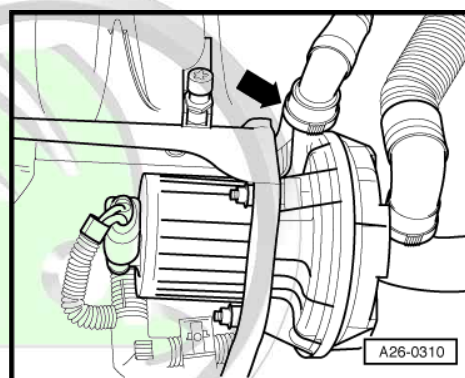
⇒ "2.2 Safety measures and rules of cleanliness when working on vehicles with liquefied petroleum gas system (LPG)", page 8.

Test sequence

- If present, remove engine cover -arrows-.



- Detach pressure hose -arrow- at the secondary air pump.

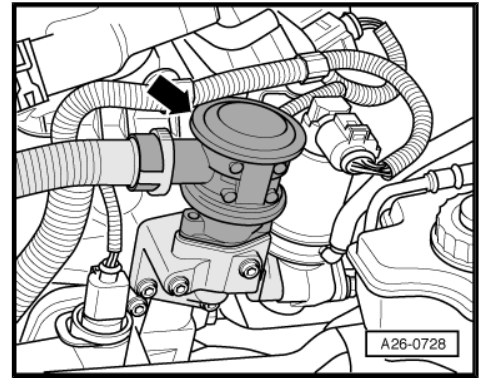


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- Blow into the tube (do not use any compressed air) by mouth using gentle pressure.
- The combination valve -arrow- must be closed, blowing through must not be possible.
- Blow into the tube (do not use any compressed air) by mouth using higher pressure.
- The combination valve must open, blowing through must be possible.

If the combination valve does not open:

- Replacing combi-valve -Position 1-
⇒ ["3.1 Secondary air system for engines with identification characters BGU, BSE, CCSA, CHGA - Summary of components", page 213](#)



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28 – Ignition system

1 Repairing ignition

⇒ "1.1 Removing and installing parts of the ignition system", page 216

1.1 Removing and installing parts of the ignition system

General notes on the injection system

⇒ "2.5 General notes on the injection system", page 12 .

1 - Ignition lead

- ☐ 4...8 kΩ
- ☐ check continuity
- ☐ Use extractor to unplug spark plug connector - T10112- .

2 - Ignition transformer -N152-

- ☐ with identification for ignition leads:

- ◆ A = Cylinder 1
- ◆ B = Cylinder 2
- ◆ C = Cylinder 3
- ◆ D = Cylinder 4

3 - 10 Nm

4 - Connector

- ☐ for ignition transformer - N152-

5 - Spark plug, 25 Nm

- ☐ Type and electrode spacing ⇒ Maintenance ; Booklet Octavia II.
- ☐ for removal and installation, disconnect plug of outer injectors
- ☐ use spark plug wrench, e.g. -3122 B- , for removing and installing

6 - Connector

- ☐ for knock sensor I -G61-

7 - 20 Nm

- ☐ The tightening torque influences the knock sensor function

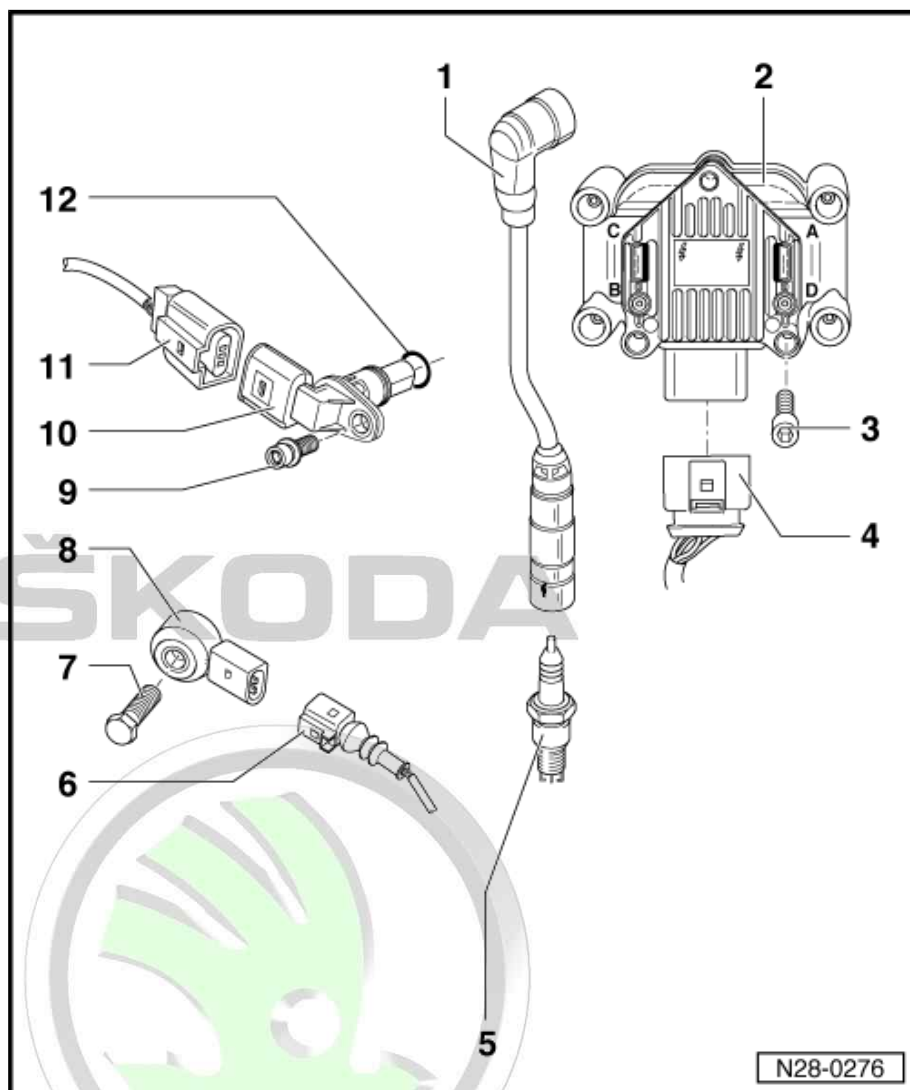
8 - Knock sensor I -G61-

9 - 10 Nm

10 - Hall sender -G40-

11 - Connector

- ☐ for hall sender -G40-



12 - O-ring

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